Video Cassette Recorder Deck : Turbo Drive Nora N1 N2 N3 N4 N5

Service
Service
Service

VR241/02/10
VR242/02
VR243/01/13
VR247/01/02/06
VR347/02/10
VR447/02

VR2410/19
VR2419/39
VR2469/39
VR3419/39
VR3469/39
VR3479/39
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2SB41/11
2SB410/18
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3SB47/11
24DV10/19

Service Manual

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Chapter

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

Survey of versions :

/01	PAL B/G
/02	PAL B/G (with VPS)
/05	PAL I England
/06	PAL B/G & SECAM L (with VPS) Swiss
/07	PAL I Ireland
/08	PAL B/G Italy
/10 /11	PAL B/G Belgium
/13	PAL B/G Nordic
/16	PAL B/G Spain
/18 /19	SECAM L
/38 /39	SECAM L & PAL B/G
/59	PAL/SECAM B/G, D/K
/60	PAL/SECAM D/K

Survey of remote controls :

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VR241/10	RT140/114	4822 218 30748
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VR2410/19 VR2419/39	RT141/144	4822 218 30754
VR2469/39 VR3469/39	RT740/144	4822 218 30755
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2SB469/38 3SB469/38	RT740/244	4822 218 30759
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Tape deck :

VR24./..	WD-T-P2/0	(2 heads)
VR34./.. 3SB../..	WD-T-P3/0	(3 heads)
VR44./..	WD-T-P4/0	(4 heads)
2.DV./..	WD-T-P2/0	(2 heads)
2SB../..	WD-T-P2/0	(2 heads)

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VR242/02	•			•	•			•	•											•	•	•
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VR247/02	•			•	•			•	•				•							•	•	•
VR247/06		•		•	•															•	•	•
VR347/02	•			•	•	•		•	•				•							•	•	•
VR347/10	•			•	•	•			•				•							•	•	•
VR2410/19			•	•	•															•	•	•
VR2419/39		•		•	•															•	•	•
VR2469/39		•		•	•								•							•	•	•
VR3419/39		•		•	•	•														•	•	•
VR3469/39		•		•	•	•														•	•	•
VR3479/39		•		•	•	•			•				•							•	•	•
2SB41/11	•			•	•				•											•	•	•
2SB410/18			•	•	•															•	•	•
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2SB469/38		•		•	•								•							•	•	•
3SB419/38		•		•	•	•														•	•	•
3SB469/38		•		•	•	•														•	•	•
3SB47/11	•			•	•	•			•				•							•	•	•
24DV10/19			•	•	•															•	•	•
N4																						
VR447/02	•			•			•	•	•		•	•	•	•	•	•	•	•	•	•	•	•
VR4469/39		•		•			•				•	•	•	•	•	•	•	•	•	•	•	•
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N5																						
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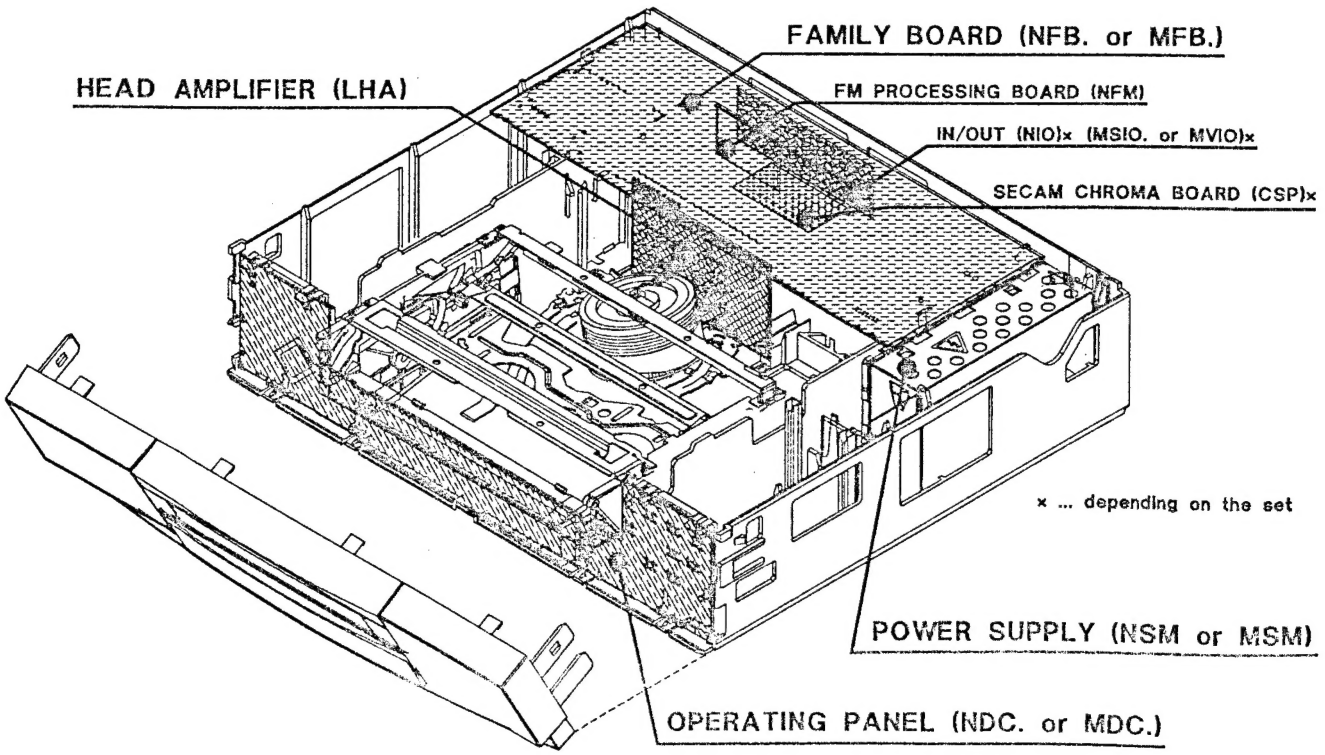
VR243/13	•			•	•			•	•	•										•	•	•

SURVEY OF SETS

	N1	N2	N3	N4	N5
VR241/02/10			◆		
VR242/02			◆		
VR243/01/13					◆
VR247/01/02/06			◆		
VR347/02/10			◆		
VR2410/19			◆		
VR2419/39			◆		
VR3419/39			◆		
VR3479/39			◆		
VR2469/39			◆		
VR3469/39			◆		
VR447/02				◆	
VR4469/39				◆	
VR4479/39				◆	
2SB41/11			◆		
2SB410/18			◆		
2SB419/38			◆		
2SB469/38			◆		
3SB419/38			◆		
3SB469/38			◆		
3SB47/11			◆		
24DV10/19			◆		



SURVEY OF SETS AND PCB'S

	POWER SUPPLY	OPERATING PANEL				FAMILY BOARD									SECAM L BOARD	IN/OUT BOARD	IN/OUT, VPS BOARD	IN/OUT, TXT BOARD	IN/OUT, VPS BOARD	IN/OUT BOARD	FM BOARD	HEAD AMPLIFIER			TAPE DECK		
						- VS-Videoprocessing		- IO-Input/Output		- FV-Frontend		- AL-Audio linear															
	MSM,NSM	NDCP2/UG	MDCP3/VPT	NDCB1/UG	NDCP4/UBG	NFB3/2GV	NFB3/2G	NFB3/2GL	NFB3/2GLV	MFB2T/2L	MFB3T/2GV	NFB4/4FG	NFB4/4FGVLP	CSP	MSIO	MSIO/VPS	MVIO	NIO/VF	NIO/F	NFM	LHA2/0	LHA3/0	LHA4/0	DM2/0	DM3/0	DM4/0
N3																											
VR241/02	•	•				•								•	•	•					•			•		
VR241/10	•	•					•								•						•			•		
VR242/02	•	•				•								•		•					•			•		
VR247/01	•	•					•								•						•			•		
VR247/02	•	•				•								•		•					•			•		
VR247/06	•	•								•				•		•					•			•		
VR347/02	•	•				•										•						•			•	
VR347/10	•	•					•								•							•			•	
VR2410/19	•	•								•				•	•						•			•		
VR2419/39	•	•						•						•	•						•			•		
VR2469/39	•	•						•						•	•						•			•		
VR3419/39	•	•						•						•	•							•			•	
VR3469/39	•	•						•						•	•							•			•	
VR3479/39	•	•						•						•	•							•			•	
2SB41/11	•			•			•							•	•						•			•		
2SB410/18	•			•						•				•	•						•			•		
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VR447/02	•				•								•					•	•	•			•			•	
VR4469/39	•				•							•		•					•	•			•			•	
VR4479/39	•				•							•		•					•	•			•			•	
N5																											
VR243/01	•		•								•						•				•			•		
VR243/13	•		•								•						•				•			•		

MFB1T/..	VST-Tuning, 1 Scart	FAMILY BOARD N1 N2
NFB1/..	VST-Tuning, 1 Scart	
NFB2/..	PLL-Tuning, 1 Scart	
NFBE/..	ECO, VST-Tuning, 1 Scart	
NFBC/..	ECO, PLL-Tuning, 1 Scart	
MFB2T/..	PLL-Tuning, 2 Scart	FAMILY BOARD N3 N5
MFB3T/..	PLL-Tuning, 2 Scart, TXT	
NFB3/..	PLL-Tuning, 2 Scart	
NFBO/..	ECO, PLL-Tuning, 2 Scart	
NFB4/..	PLL-Tuning, 2 Scart, Audio dub.	FAMILY BOARD N4

(GB)

TECHNICAL DATA

Mains voltage	180 - 240 V
Mains frequency	45 - 65 Hz
Power consumption	15 W
Ambient temperature	+10°C - +35°C
Relative humidity	20 - 80%
Dimensions	380 x 86 x 338 mm
Weight	~ 4,6 kg
Fast forward/rewind time	typ. 95s (260s ECU) E180 cass.
Position of use	horizontally, max 15°
Video-resolution	>234 lines
Audio	SP : 80Hz - 10kHz (≤8dB)
	LP : 80Hz - 5kHz (≤8dB)

(D)

TECHNISCHE DATEN

Netzspannung	180 - 240 V
Netzfrequenz	45 - 65 Hz
Leistungsaufnahme	15 W
Raumtemperatur	+10°C - +35°C
Relative Luftfeuchtigkeit	20 - 80%
Abmessungen	380 x 86 x 338 mm
Gewicht	~ 4,6 kg
Vor-/Rückspulzeit	typ. 95s (260s ECU) E180 cass.
Betriebslage	horizontally, max 15°
Video-Auflösung	>234 lines
Audio	SP : 80Hz - 10kHz (≤8dB)
	LP : 80Hz - 5kHz (≤8dB)

(F)

CARACTERISTIQUES

Tension secteur	180 - 240 V
Fréquence	45 - 65 Hz
Puissance absorbée	15 W
Température ambiante	+10°C - +35°C
Humidité relative	20 - 80%
Encombrement	380 x 86 x 338 mm
Poids	~ 4,6 kg
Temps (re-)bobinage	typ. 95s (260s ECU) E180 cass.
Position d'emploi	horizontally, max 15°
Puissance absorbée	>234 lines
Audio SP :	80Hz - 10kHz (≤8dB)
LP :	80Hz - 5kHz (≤8dB)

(NL)

TECHNISCHE GEGEVENS

Netspanning	180 - 240 V
Netfrequentie	45 - 65 Hz
Opgenomen vermogen	15 W
Omgevingstemperatuur	+10°C - +35°C
Relatieve vochtigheid	20 - 80%
Afmetingen	380 x 86 x 338 mm
Gewicht	~ 4,6 kg
Vooruit/terugspoeltijd	typ. 95s (260s ECU) E180 cass.
Gebruikspositie	horizontally, max 15°
Oplossend vermogen	>234 lines
Audio	SP : 80Hz - 10kHz (≤8dB)
	LP : 80Hz - 5kHz (≤8dB)

(E)

DATOS TECNICOS

Tensión de red	180 - 240 V
Frecuencia de red	45 - 65 Hz
Consumo de potencia	15 W
Temperatura ambiente	+10°C - +35°C
Humedad relativa	20 - 80%
Dimensiones	380 x 86 x 338 mm
Peso	~ 4,6 kg
tiempo de (re-)bobinado	typ. 95s (260s ECU) E180 cass.
Posición de uso	horizontally, max 15°
Resolución video	>234 lines
Audio	SP : 80Hz - 10kHz (≤8dB)
	LP : 80Hz - 5kHz (≤8dB)

(I)

DATI TECNICI

Tensione di alimentazione	180 - 240 V
Frequenza di rete	45 - 65 Hz
Potenza assorbita	15 W
Temperatura ambiente	+10°C - +35°C
Umiditá relativa	20 - 80%
Dimensioni	380 x 86 x 338 mm
Peso	~ 4,6 kg
Tempo di (ri-)avvolgimento	typ. 95s (260s ECU) E180 cass.
Posizione di funzionamento	horizontally, max 15°
Risoluzione video	>234 lines
Audio SP :	80Hz - 10kHz (≤8dB)
LP :	80Hz - 5kHz (≤8dB)

(GB) SAFETY INSTRUCTIONS

- Safety regulations demand that the set be restored to its original condition and that components identical with the original types be used.
  Safety components are marked by the symbol ⚠
- All IC s and many other semi- conductors are susceptible to electrostatic discharges(ESD). Careless handling during repair may reduce life drastically. When repairing, make sure that you are conneted with the same potential as the mass of the set via a wrist wrap with resistance. Keep components and tools on the same potential.
- A set to be repaired should always be connected to the mains via a suitable isolating transformer.
- Never replace any modules or any other parts while the set is switched on.
- Use plastic instead of metal alignment tools. This in order to prelude short-circuit or to prevent a specific circuit from being rendered unstable.

REMARKS

- The direct voltages and oscillograms ought to be measured relative to the set mass.
- The direct voltages and oscillograms mentioned in the diagrams ought to be measured with a colour bar signal and the picture carrier at 503.25 MHz (C25).
- The oscillograms and direct voltages have been measured in RECORD or PLAY mode.
- The semiconductors, which are mentioned in the circuit diagram and in the parts lists, are fully exchangeable per position with the semiconductors in the set, irrespective of the type designation of these semiconductors.

(D) SICHERHEITSHINWEISE

- Die Sicherheitsvorschriften erfordern es, daß sich das Gerät nach der Reparatur in seinem originalen Zustand befindet und daß die zur Reparatur benutzten Ersatzteile mit den OriginalErsatzteilen identisch sind.
  Sicherheits-Bauteile sind mit der Markierung versehen ⚠
- Alle IC's und Halbleiter sind empfindlich gegen elektrostatische Entladungen (ESD). Unvorschriftmässige Behandlung von Halbleitern im Reparaturfall, kann zur Zerstörung dieser Bauteile oder zu einer drastischen Reduzierung der Lebensdauer führen. Sorgen Sie dafür, dass Sie sich im Reparaturfall über ein Armband mit Widerstand auf dem gleichen Potential, wie die Masse des Gerätes befinden. Alle Bauteile, Werkzeuge und Hilfsmittel sind auf das gleiche Potential zu legen.
- Ein zu reparierendes Gerät ist immer über einen Trenntransformator an die Netzspannung anzuschliessen.
- Bei eingeschaltetem Gerät dürfen keine Module oder sonstige Einzelteile ausgetauscht werden.
- Zum Abgleich sind ausschliesslich Kunststoffwerkzeuge zu benutzen (keine Metallwerkzeuge verwenden). Dadurch wird vermieden, dass ein Kurzschluß entstehen kann oder eine Schaltung instabil wird.

ANMERKUNGEN

- Die Gleichspannungen und Oszillogramme sind gegen Gerätemasse zu messen.
- Die Gleichspannungen und Oszillogramme angeführt in den Schaltbildern sollen unter folgenden Bedingungen gemessen werden: Farbbalkensignal, Bildträger auf 503.25 MHz (C25)
- Die Oszillogramme und Gleichspannungen sind in RECORD oder PLAY gemessen.
- Die in den Stücklisten aufgeführten Bauteile sind positionsweise voll auswechselbar gegen die Bauteile in dem Gerät, ungeachtet der etwaigen Typenbezeichnungen.

(F) AVERTISSEMENTS

- Les normes de sécurité exigent qu'aprés réparation l'appareil soit remis dans son état d'origine et que soient utilisées les piéces de rechange identiques à celles spécifiées.
  Les composants de sécurité sont marqués ⚠
- Tout les IC et beaucoup d'autres semi-conducteurs sont sensibles aux décharger statiques (ESD). Leur longévité pourrait étre considérablement écourté par le fait qu'aucune précaution n'est prise à leur manipulation. Lors de réparations s'assurer de bien étre relié au méme potential que la masse de l'appareil et enfiler le bracelet serti d'une résistance de sécurité. Veiller à ce que les composants ainsi que les outils que l'on utilise soient également à ce potentiel.
- Toujours alimenter un appareil à réparer à travers un transfo d'isolement.
- Ne jamais remplacer les modules ni d'autres composants quand l'appareil est sous tension.
- Pour l'ajustage, utiliser des outils en plastique au lieu d'instruments métalliques. Ceci afin d'éviter les court - circuits et exclure l'instabilité dans certains circuits.

OBSERVATIONS

- La mésure des tensions continues et des oscillogrammes doit se faire par rapport à la terre de l'appareil.
- La mésure des tensions continues et des oscillogrammes figurant sur le schéma doit se faire dans un signal de barre couleur porteuse image sur 503.25 MHz (C25).
- Les oscillogrammes et tension sont mésurées en mode RECORD ou PLAY.
- Les semi-conducteurs indiqués dans le schéma de principe et à la liste des compostants, sont interchangeables par repère sur ce chassis avec les semi-conducteurs de l'appareil quelle que soit la désignation de type donnée sur ces semi-conducteurs.

(NL) VEILIGHEIDSINSTRUCTIES

- Veiligheidsbepalingen vereisen, dat het apparaat in zijn oorspronkelijke toestand wordt teruggebracht en dat onderdelen, indentiek aan de oorspronkelijke, worden toegepast. De veiligheidsonderdelen zijn aangeduid met het symbool ⚠
- Alle IC's en vele andere halfgeleiders zijn gevoelig voor elektrostatische ontladingen (ESD). Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen verminderen. Zorg ervoor, dat U tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat. Houd componenten en hulpmiddelen ook op ditzelfde potentiaal.
- Sluit een apparaat dat gerepareerd wordt altijd via een scheidingstransformator aan op de netspanning.
- Verwissel nooit modules of andere onderdelen terwijl het apparaat is ingeschakeld.
- Gebruik voor het afregelen plastic i.p.v metalen gereedschap. Dit om mogelijke kortsluiting te voorkomen of een bepaalde schakeling instabiel te maken.

OPMERKINGEN

- De gelijksspanningen en oscillogrammen dienen gemeten te worden ten opzichte van de apparaat aarde.
- De gelijksspanningen en oscillogrammen vermeld in de schema's dienen gemeten te worden met een kleurbalkensignaal beelddraaggolf op 503.25 MHz (C25).
- De oscillogrammen en gelijksspanningen zijn in RECORD of PLAY mode gemeten.
- De halfgeleiders, die in het pricipeschema en in de stuklijsten, zijn vermeld, zijn per positie volledig uitwisselbaar met de halfgeleiders in het apparaat, ongeacht de typeaanduiding op deze halfgeleiders.

(E) AVISOS

- Las instrucciones de seguridad exigen que, después de la reparación, el aparato se encuentre en el estado original y que las piezas de repuesto, utilizadas para la reparación, sean idénticas a las originales.
  Los componentes de seguridad están marcados con ⚠
- Todos los IC y semiconductores son sensibles a descargas electrostáticas (ESD). Un tratamiento no conforme a las instrucciones de semiconductores, en caso de reparación, podría llevar a la destrucción de estos componentes o a una reducción drástica de la duración. En caso de reparación tenga cuidado de que esté al mismo potencial que la masa del aparato, por una pulsera con resistencia. Ponga todos los componentes, herramientas y recursos al mismo potencial.
- Para reparar un aparato hay que conectarlo siempre a la alimentación a través de un transformador de aislamiento.
- Cuando un aparato está en marcha no pueden ser cambiados módulos u otras piezas de repuesto.
- Para los ajustes hay que utilizar exclusivamente herramientas de plástico (nunca herramientas metálicas). Así se evitarán cortocircuitos y circuitos inestables.

NOTAS

- Hay que medir las tensiones continuas y los oscilogramas contra la masa del aparato.
- Las tensiones continuas y los oscilogramas mencionados en los esquemas tienen que ser medidos de la manera siguiente: señal barra de color portadora de imagen en 503.25MHz (C25)
- Los oscilogramas y las tensiones continuas son medidas en "RECORD" y "PLAYBACK"
- Los componentes mencionados en las listas se los puede cambiar por los componentes en el aparato, a pesar de eventuales designaciones de tipos.

(I) AVVERTIMENTI

- Le prescrizioni di sicurezza richiedono che l'apparecchio sia ricondotto alle condizioni originali e che siano usati ricambi originali. Componenti di sicurezza sono marcati con ⚠
- Tutti gli IC e semiconduttori sono sensibili a scariche elettrostatiche (ESD). Noncuranze durante la riparazione di semiconduttori possono danneggiarli o condurre ad una riduzione drastica della durata. Durante la riparazione assicurarsi di essere collegati allo stesso potenziale attraverso un bracciale di protezione contro scariche elettrostatiche. Inoltre tenere anche tutti i componenti e gli attrezzi a questo potenziale.
- Apparecchi da riparare bisogna collegarli sempre via un trasformatore isolante (separatore) alla tensione normale.
- Non scambiare moduli o altri componenti quando l'apparecchio è in funzione.
- Per l'accordo usare soltanto attrezzi di plastica (non usare attrezzi metallici). Cosí si evitano cortocircuiti e collegamenti instabili.

OSSERVAZIONI

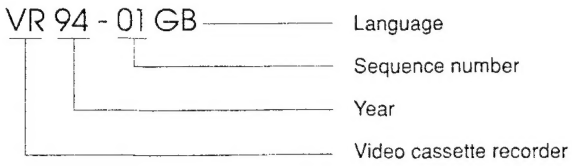
- Misurare le tensioni continue e gli oscillogrammi riferiendosi alla massa dell'apparecchio.
- Le tensioni continue e gli oscillogrammi indicati negli schemi di collegamento devono essere misurati secondo le condizioni seguenti: segnale barre colore, portante dell'immagine su: 503.25 MHz (C25).
- Gli oscillogrammi e le tensioni continue sono misurati in RECORD o PLAYBACK.
- I semiconduttori che sono menzionati negli schemi e nelle liste sono intercambiabili con quelli di pari tipo nonostante siano montati in posizione diversie.

MODIFICATIONS

Description of the system used for publishing modification data and supplements to the service manual.

All modification data and supplements to the Service Manual are published by means of Service Information bulletins.

Each Service information has a number, for example :



A Service Information bulletin concists of a front sheet, as the case may be followed by supplementary and/or replacement sheets.

Replacement sheets serve to replace existing sheets in the Service Manual. These sheets are identified by an additional letter after the page number, for example 5-1a. Page 5-1a then takes the place of page 5-1.

Supplementary sheets are inserted between the existing sheets in the Service Manual. These sheets can be identified by an additional figure following the page number, for example 5-1-1.

Sheet 5-1-1 should be inserted after page 5-1.

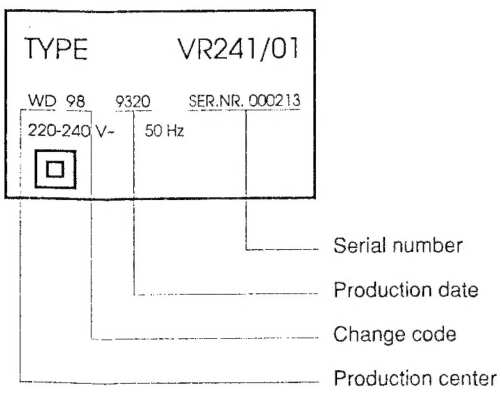
Description of the system by means of which modifications are indicated in the recorder.

All important parts of the recorder, such as tape deck, p.c. boards and modules, are provided with a sticker. These stickers specify a number of product data. The meaning of this data will now be explained for the most important sections.

- **The complete recorder**

The type plate is located at the back of the recorder, below an example of such a type plate is given.

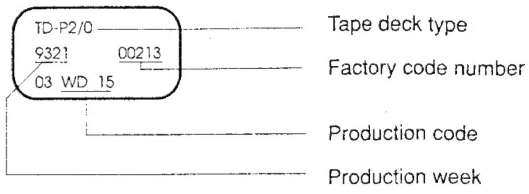
Type plate :



Note :

In the case of an important modification to the recorder the productionscode on the type plate is increased by one. E.g. 00 becomes 01.

- **Tape deck**



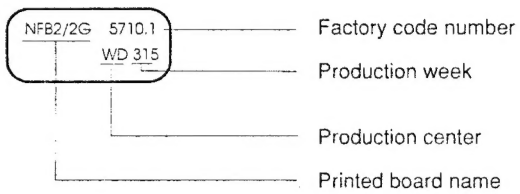
Note :

The production code and the serial number on the tape deck need not correspond to the production code and the serial number on the type plate.

- **Printed panels**

The stickers are generally located on the track side of the module.

Example :



Remarks :

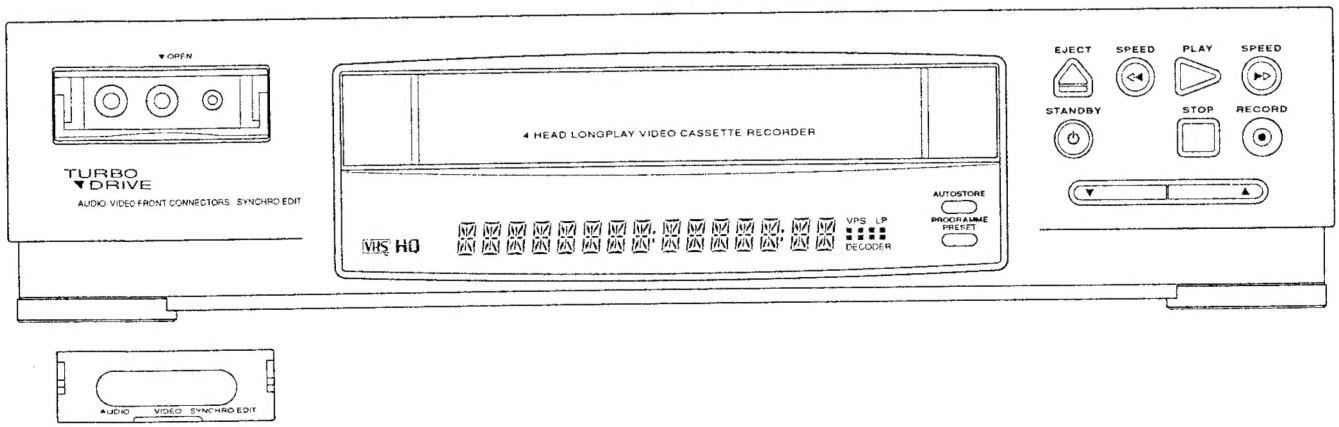
The production status number will not always be mentioned.

In case of an important modification, the last figure of the factory code number (point number) is increased by one. E.g. 5710.1 becomes 5710.2.

TABLE OF CONTENTS

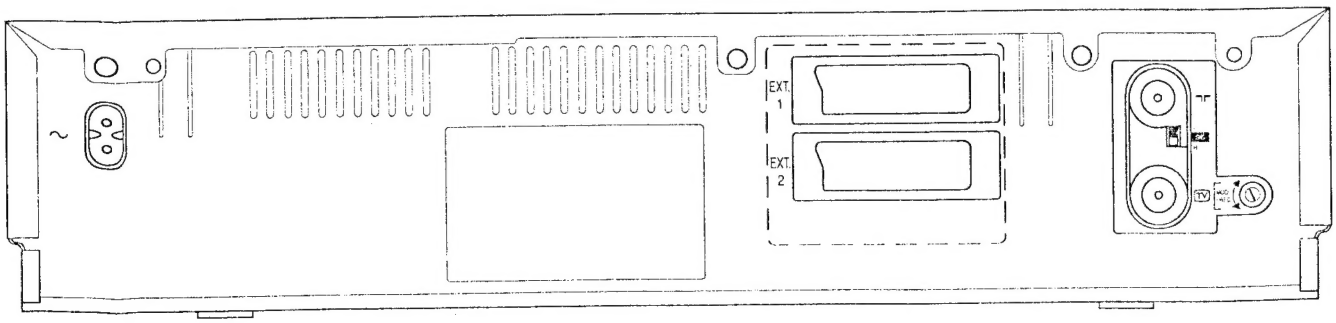
Symbol on front of video recorder

AUTOSTORE	Autostore
PROG. PRESET	Programme preset
EJECT	Cassette eject
◁◀ SPEED	Rewind/Reverse scanning
PLAY	Playback
SPEED ▶▷	Forward wind Forward scanning
STANDBY ⏻	Switch off
STOP	Stop
RECORD ●	Record
▼	Down / Minus, programme number
▲	Up / Plus, programme number
AUDIO	Audio chinch
VIDEO	Video chinch
SYNCHRO EDIT	Synchro edit

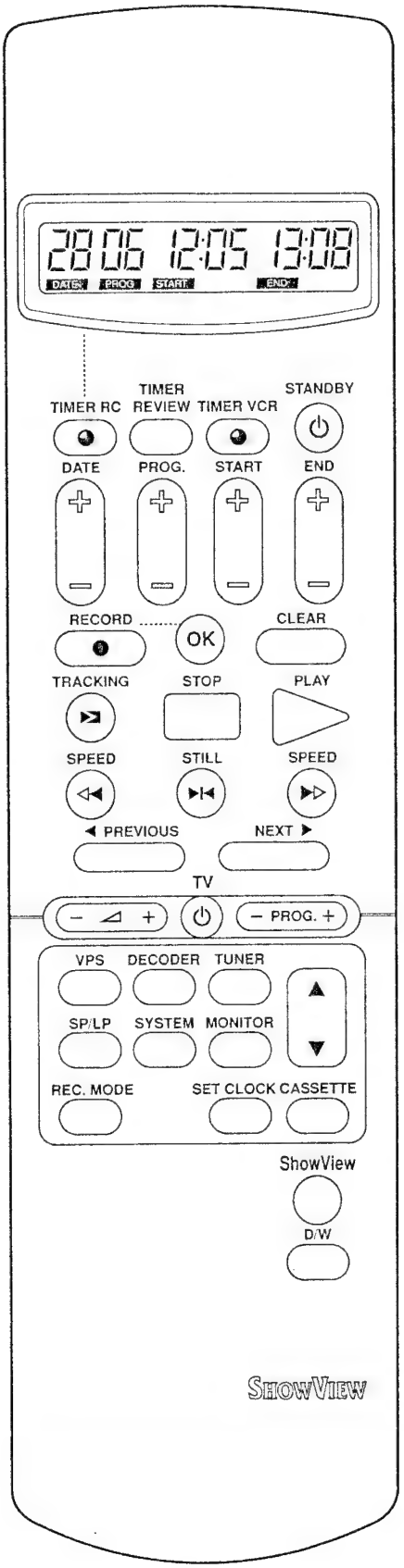


Symbol on back of video recorder

⊤	Aerial input socket
TV	Aerial output socket
~	Mains socket
EXT 1	AV-Euro socket (Scart)
EXT 2	AV-Euro socket (Scart)
MOD. FREQ.	Channel control
SIG	Attenuator switch



The remote control



TIMER RC	Timer RC
TIMER REVIEW	Timer Review
TIMER VCR	Timer VCR
STANDBY	Standby
DATE +/-	Timer Date +/–
PROG. +/-	Timer Programme +/–
START +/-	Timer Start Time +/–
END +/-	Timer Stop Time +/–
RECORD	Record (OK and RECORD button simultaneously)
OK	OK
CLEAR	Reset/clear
TRACKING	Tracking/optimum setting
STOP	Stop
PLAY	Playback
SPEED	Rewind/Reverse scanning
STILL	Pause/Still picture
SPEED	Wind/Forward scanning
◄ PREVIOUS	Previous picture
NEXT ►	Next picture
VPS	VPS On/Off
DECODER	Decoder
TUNER	Tuner
▲	Up
▼	Down
SP/LP	Tape speed selection (SP/LP)
SYSTEM	System
MONITOR	Monitor
REC.MODE	Record mode
SET CLOCK	Set clock on video recorder
CASSETTE	Cassette
SHOW VIEW	'ShowView' programming
D/W	Daily/weekly programming

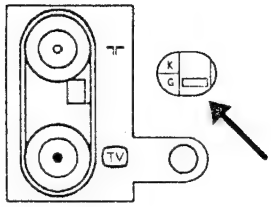
Additional TV functions:

– ◿ +	Up/Down TV
⏻	Switch On/Off
– PROG. +	Up/Down programme number

Note: Only works on televisions with the same remote control code.

The G/K switch

You can connect this video recorder with a TV set equipped either with a West European PAL-B,G TV-standard ('G') or with an East European SECAM-D,K TV-standard ('K').
If you don't hear the sound from the video recorder during playback, switch to the other TV-standard.
The switch is positioned at the back. In our factory the switch G/K is set to position 'G'.



Setting the clock and date on the video recorder

In order to be able to programme recordings, you must first ensure that the video recorder clock is correctly set. To do this, use the DOWN ▼ or UP ▲ buttons on the remote control in all the following steps.

1. Press the SET CLOCK button on the remote control. 'TIME' will appear in the video recorder display. Set the current time.

2. Press the OK button. 'YEAR' will appear in the display. Set the current year.

3. Press the OK button again. 'MONTH' will appear in the display. Set the current month.

4. Press the OK button again. 'DATE' will appear in the display. Set today's date.

5. Press the OK button again. The time and date have now been set. In confirmation, 'READY' will appear briefly in the display.

Setting the display language and the wide screen format

You can select from ten languages for the display on your video recorder and select the screen format.

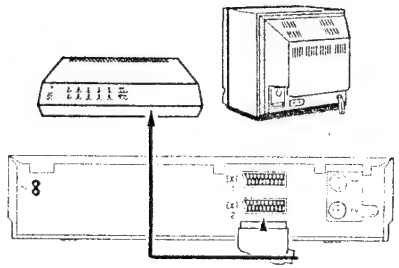
1. Ensure that there is no cassette in the cassette slot. With the video recorder switched off, press the KASSETTE and WIEDERGABE buttons simultaneously.
2. Use the ▼ or ▲ button to select the required display language, e.g.: 'ENGLISH'.

3. Press the OK button **twice.**
4. '4:3' appears in the display. If you have one of the new wide screen TV sets, use the ▲ button to switch over to the '16:9' format. Otherwise, leave the setting at '4:3'.
5. Finally, press the BEREITSCHAFT ⏻ button.

Connecting a decoder

Some TV broadcasters transmit encoded television signals which you can only see with a purchased or rented decoder. You can connect such a decoder (descrambler) to this video recorder.

1. Connect the decoder to the video recorder with an AV-Euro cable (EXT 2 socket).
   You will find a description of how to store TV channels with the decoder in the chapter **'Storing TV channels'.**
2. Connect the TV set to the EXT 1 socket.



Note:
* You cannot use the decoder with your video recorder and your TV set simultaneously.
* On your video recorder select the programme number that you allocated to the decoder function when storing the channel numbers. The video recorder will then automatically use the decoder.

Still picture/Super-slow motion

❶ Press the PLAY► button on the remote control.

❷ Press the STILL ▶I◀ button. The picture will stand still.
Each time you press STILL ▶I◀ again the picture will move on one step at a time.
Hold down the STILL ▶I◀ button. The picture will be played in super-slow motion.

❸ Press the PLAY► button to continue playing back at the normal speed.

Special note:
* If the still picture vibrates vertically, keep pressing the TRACKING button until the vibration disappears.
If you pass the optimum setting, repeat this step with the TRACKING button.
You only have to find the optimum setting for your TV set once as the video recorder will store it automatically.
Please note, however, that interference may still occur with poor quality hired cassettes.
This is not a fault in your video recorder.

Searching for a tape position

Sometimes you may have recorded two or more TV programmes on one cassette.
So that you do not have to spend time searching, your video recorder offers you an automatic search facility.

The video recorder marks the tape with code marks every time you start to record. You can search for these code marks on the tape using the PREVIOUS and NEXT buttons on your remote control.

❶ Press the NEXT button to select the next code mark or the PREVIOUS button for the previous code mark.

Either 'NEXT' or 'PREVIOUS' will appear in your video recorder display.

❷ Once the video recorder finds the code mark it will automatically switch to playback.

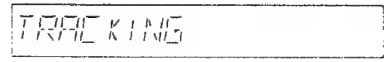
Note:
* When you press any tape transport button (e.g.: the PLAY► or PAUSE / STOP ❚❚■ button) this search function will be stopped.
* You cannot use this function with recordings made on another video recorder that does not have this function.

How do I eliminate picture interference?

Every time a cassette is loaded the video recorder will **automatically** set the correct tracking position.
For **recordings made on another video recorder** you may be able to improve on the automatic setting as follows:

❶ Press the PLAY► button on your remote control.

❷ Press the TRACKING button on your remote control.



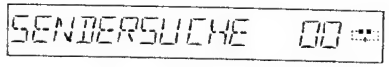
❸ Press the PLAY► button as soon as the playback quality is at its best. This setting will remain until you remove the cassette.

Automatic channel search

The video recorder will search for all TV channels at the same time.

1 Switch on the TV set.
Many TV sets **switch automatically** to the programme number for the video recorder at step 2. However, this will only function if your video recorder is connected to the TV set with a scart cable. Otherwise, select the video programme number on your TV set.

2 With the video recorder switched off, press the AUTOSTORE button on your video recorder **for a few seconds.** The automatic channel search function starts. 'AUTOSTORE' appears in the display.



3 Wait until all the TV channels have been found. This can take several minutes.

4 All the TV channels have been found.
If the video recorder recognizes that the TV set has been connected via a scart cable, the allocation of the TV channels will begin automatically.
Otherwise, the automatic channel search will stop **here.** Then read further in the next section.

5 'SELECT TV P 01' appears in the display.

6 Confirm with the OK button on the remote control for the video recorder. The video recorder compares the TV channels on the TV set and the video recorder.

If the video recorder has the same TV channel (e.g.: 'P 01') as the TV set, then it stores it.

7 Wait until, e.g., 'SELECT TV P 02' appears in the display.

8 Select, either **on the TV set** or with the remote control for the TV set, the next programme number, e.g.: '2'.

9 Confirm with the OK button on the remote control for the video recorder.

10 Repeat steps 7 to 9 until all the TV channels have been allocated.
If you wish to finish prematurely, press the BEREITSCHAFT ⏻ button.

Finally, check again that all the TV channels are in the same sequence on both the video recorder and the TV set.
You can read about how to change the sequence in the next section, 'Allocating channel numbers'.

Note:
* After any subsequent activation of the search function, the newly-found TV channels will be added at the end of those previously stored.
* You can store up to 42 TV channels.
* When you activate the 'Automatic channel Search' function, any TIMER blocks which have been programmed will be cleared.

Allocating channel numbers (Programme

Allocating channel numbers (Programme Preset)

You can allocate any desired programme number to the TV channels stored by the Automatic Channel Search. For example, so that they are in the same sequence as on the TV set.

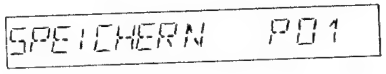
❶ Switch on your TV set.
Many TV sets **switch automatically** to the programme number for the video recorder at step ❷. However, this will only function if your video recorder is connected to the TV set with a scart cable. Otherwise, select on your TV set the programme number for the video recorder.

❷ Press the PRESET ALLOC. button on your video recorder **for a few seconds.**
A frequency number and 'STORE P 01' will appear in the display.
You will find a 'Frequency Table' on the last page of this Operating Manual.

❸ Use the ▲ or ▼ button on your remote control to select the TV channel to which you wish to allocate programme number 'P 01'.

Note:
* Have you used a scart cable to connect the video recorder to your TV set and does your TV set respond to the switch-over with the MONITOR button on the remote control? If so, you can switch to and fro between TV reception and video recorder reception. This is the easiest way for you to allocate the same TV channels to the same programme numbers on both appliances.

❹ Confirm the allocation by pressing the OK button on the remote control. 'STORED' will appear briefly in the display.
If you wish to delete an **unwanted** TV channel, press the CLEAR button.



❺ The video recorder will now display the next programme number, 'P 02'. Repeat steps ❸ and ❹ until you have numbered all the TV channels.

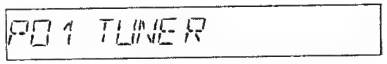
❻ When you have finished, press the PRESET ALLOC. button on your video recorder.

Note:
* Unused (free) programme numbers cannot be selected.
* If you wish to delete an **unwanted** TV channel, press the PRESET ALLOC. button. Then, select the associated programme number and press the CLEAR button.
* By pressing the VPS button you can display the name of the TV channel, e.g.: BBC 1, while you are allocating the channel numbers. Of course, the name can only be displayed when it is indeed being transmitted by the TV station.
* If a TV station broadcasts encoded programmes and your video recorder is connected to a decoder, press the DECODER button on the remote control at step ❸. 'DECODER' appears in the display. The video recorder will activate the decoder function from now on when you select this TV channel number (= this programme number).
* If you want to fine tune the automatic TV channel setting (step ❹), press the TRACKING button. Now you can use the +/- function to vary from the standard value '0' within a range of +4 to -4.
Important: Such fine re-tuning is only necessary and useful in **special cases**, e.g. when there are stripes on the picture in cable-TV systems. However, the picture and sound quality may deteriorate.
* If the picture quality is poor, e.g.: negative or rolling, you might have selected the wrong TV standard, e.g.: the PAL standard instead of the SECAM standard or vice versa. Press the SYSTEM button at step ❸ to change the TV standard.

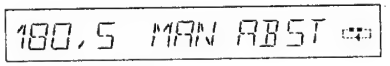
Manual channel search

In certain cases the Automatic Channel Search may not be able to find all of the TV channels (e.g. coded TV channels). You can then use this manual method to set the channels.

- Switch on the TV set and select the programme number for the video recorder.
- Press the [TUNER] button on the remote control.



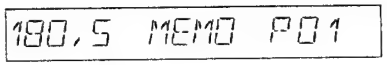
- Press the [PRESET ALLOC.] button on the video recorder **for more than five seconds.**



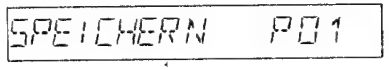
- Hold down the [▼] or [▲] button on the remote control until you have found the right TV channel. A changing frequency number will appear in the display. If you know the frequency number of a TV channel, you can **also directly** enter the frequency (4 digits) with the digit buttons [0-9].

If the TV channel you have found is transmitted encoded and your video recorder is connected to a decoder, press the [DECODER] button on your remote control. 'DECODER' appears in the video recorder display.
The video recorder will activate the decoder function from now on when you select this TV channel number (= this programme number).

- Press the [OK] button on your remote control.



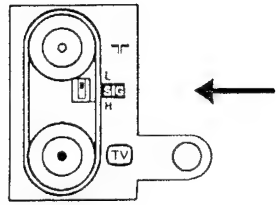
- Use the [▼] or [▲] button on your video recorder to select the programme number that you wish to allocate to this TV channel.



Attenuator switch - SIG

You should normally leave the attenuator switch at the back of the appliance in the [L] position.

Only use the [H] position if there is a great deal of interference when receiving TV stations with strong signals.



Auto-assembling

You can use the auto-assembling function to join individual recordings without any annoying flickering between the recordings.

1. Press the [PLAY►] button. Search for the correct position on the tape and then stop the playback by pressing the [PAUSE / STOP ❚❚■] button. 'PAUSE' will appear in the display.

2. Now start recording as usual by pressing the [RECORD ●] button.

Synchronous Editing (Synchro-Edit)

You can edit synchronously with a suitable connection cable between an appropriately equipped camcorder and the video recorder.

Both appliances are started at the right time with the help of a synchronized pulse and the adjustable 'switch-on' (pre-roll) time.
Two different operating and cabling variations are possible. Connect both appliances when they are switched off.

Pay attention also to the operating instructions for your camcorder. The video/audio signal is transmitted via the AUDIO and VIDEO sockets in the video recorder. These sockets can be found at the front of the video recorder, behind a flap on the left.

❶ Press the **REC.MODE** button several times until 'EDIT' appears in the display.

❷ You can change the 'switch-on' (pre-roll) time with the ▼ or ▲ button. The display will show, e.g. 'START 1:56' (seconds).

❸ Confirm your setting with the PAUSE / STOP button.

❹ On the video recorder, locate the right tape position for the recording. Press the PAUSE / STOP button again.

❺ Locate the right tape position on the camcorder.

❻ Press the 'PAUSE' button on the camcorder.

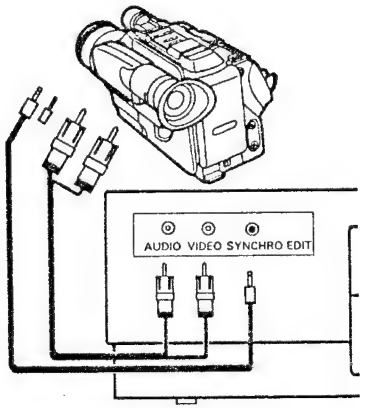
❼ Corresponding to the above cabling, there are two ways to start editing.

Variant 1:

❽ Start the editing process with the AUFNAHME button on the video recorder. The camcorder starts with 'PLAYBACK' and the video recorder starts synchronously with 'RECORD'.

❾ Stop the recording with the PAUSE / STOP button on the video recorder.

❿ Switch off the video recorder with the BEREITSCHAFT ⏻ button.

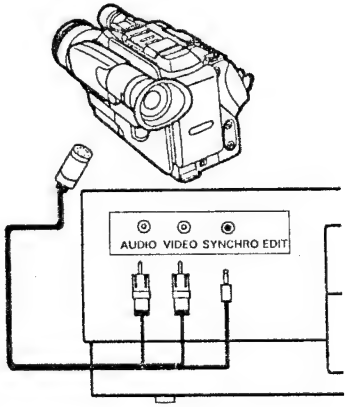


Variant 2:

❽ Start the editing process, e.g. with the 'EDIT' button on the camcorder. The camcorder starts with 'PLAYBACK' and the video recorder starts synchronously with 'RECORD'.

❾ Stop the recording with the 'PAUSE' button on the camcorder.

❿ Switch off the video recorder with the BEREITSCHAFT ⏻ button.



Note:
* If the start of the scene to be edited is missing, then the setting for the 'pre-roll' time is too long. Simply set a shorter time (e.g. 1:40) as described in step ❷. If the recording starts before the scene to be edited, the setting for the pre-roll time is too short. Then you must increase the set time, e.g. to 2:10.

Long play function

You can reduce the recording speed by half. This makes it possible to record, for example, 8 hours instead of 4 hours on an E240 cassette.

❶ **Before** recording, select the 'LP' (=Long Play) recording speed by pressing the [SP/LP] button. 'LP' will appear in the display.

❷ During playback the video recorder will automatically select the correct playback speed.

Note:
* You will obtain the best picture quality by recording at the standard speed ('SP').

What is 'Programme Delivery Control' (PDC)?

With PDC, the TV station controls when the video recorder is switched on and off. This means that the video recorder switches on and off at the right time even if a TV programme you have programmed begins earlier or finishes later than expected - provided that the TV station is actually transmitting PDC.
Not all TV stations transmit a PDC code.

Some notes:
* The PDC function is **only** possible with the function 'Programming with TXT/VPT'.
* The first few seconds of a recording may be missing if the switch-on command sent by the TV station is late.
* PDC only functions faultlessly with good TV reception. When reception is poor, some programmed recordings with VPS may not function correctly. This is not a fault in the video recorder.

TODAY programming on the video recorder

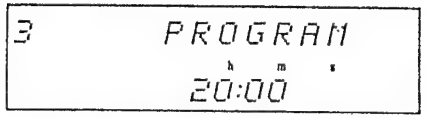
It is very easy to programme a recording for TODAY. You only need to enter the programme number and the start time.
Please note that only **one** TODAY programming is possible per day.
The recording will be made until the end of the loaded cassette.
Of course, if you activate the VPS function, the recording will be made only until the end of the selected TV programme.

Note:
* You cannot use the PDC function with TODAY programming.
* The tape speed (standard play or long play) can be selected before programming with button [SP/LP] on the video recorder.
* Make sure a cassette without recording protection is inserted.

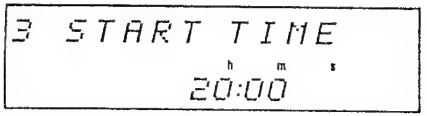
❶ Press button [TODAY] on the video recorder.

The programme number currently selected flashes.

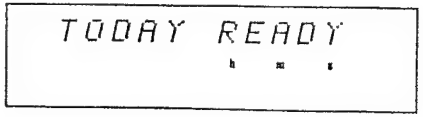
❷ Use button [-] or [+] (recorder) to select the programme number of the TV channel from which you want to record.



❸ Press button [TODAY] again. The start time flashes in the display.
Use button [-] or [+] (recorder) to select the start time.
Use button [SELECT] (recorder) to switch VPS on or off.



❹ Have you entered all the data correctly? If so, press button [TODAY].
The data are recorded in the video recorder. "TODAY READY" appears in the video recorder's display.



❺ To finish programming, press button [STANDBY ⏻].
TODAY appears in the video recorder's display.

This concludes the programming procedure.

This is not a fault in the video recorder.

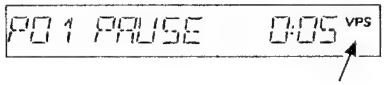
❹ To finish programming, press button [STANDBY ⏻].
TODAY appears in the video recorder's display.

This concludes the programming procedure.

What is VPS (Video Programming System)?

With VPS, the TV station controls when the video recorder is switched on and off. This means that the video recorder switches itself on and off at the **right time** even if a TV programme you have programmed begins earlier or finishes later than expected.

Assuming, that is, that the TV station actually transmits VPS.
Not all TV stations transmit a VPS signal.
You can see if a TV station is transmitting a VPS time code by the indication 'VPS' that appears in the display in the 'STOP' or 'PAUSE' mode.



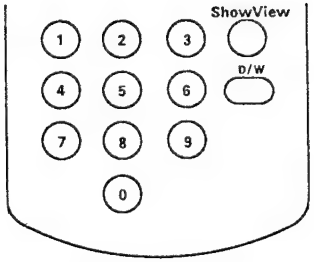
Usually the start time is the **same** as the VPS time code. If, however, in the TV guide, in addition to a TV programme's start time, a different VPS time code is given, e.g.: '20.15 (VPS 20.14)', you have to enter '20.14' as the start time when programming the VPS time code.
Please pay close attention to the VPS information alongside the individual TV programmes in your TV guide. This is because a VPS recording will only function if you set the VPS time code exactly to the minute.

Note:
* With VPS you can only programme two chronologically successive TV programmes as two separate TIMER blocks.
* VPS only functions faultlessly with good TV reception. When reception is poor, some programmed recordings with VPS may not function correctly. This is not a fault in the video recorder.

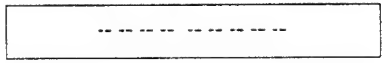
Programming with ShowView

With this method the programming will be as easy as dialing a telephone number. You only have to enter the 'ShowView code' (3 to 9 digits) printed in your TV guide next to the start time of a TV programme. Make sure that a cassette without erase protection has been loaded.

❶ Press the [SHOWVIEW] button on the remote control.

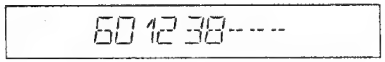


The video recorder display shows a series of dashes. To exit from this function press the [CLEAR] button.



❷ Enter the entire 'ShowView code' with the digit buttons [0-9]. This code (3 to 9 digits) is found next to the start time of a TV programme in your TV guide. If you entered an incorrect code number, clear it with the [CLEAR] button.

❸ If you want to repeat programming at daily or weekly intervals, press the [D/W] button once or twice. The display shows an additional 'DLY' (= daily) or 'WLY' (= weekly). The 'daily' function can only be used for recordings to be made from Mondays to Fridays inclusive.



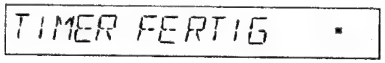
❹ Press the [SHOWVIEW] button. The programmed code is now decoded. If the video recorder has decoded correctly, the display shows the resultant data. The time is shown in the 24 hour mode.

Note: * If the programme number flashes, e.g.: 'E 2', the video recorder cannot connect the TV channel identification contained in the 'ShowView code' (e.g.: for BBC 1) with the programme number in the video recorder (e.g.: 'P 02').
When this occurs, select the correct programme number with the PROG. +/– button and press the SHOWVIEW button. The video recorder stores this allocation (e.g.: BBC 1 = P 02). From now on, it will use it for all ShowView programming for this channel.

If necessary the data can now be changed with the buttons DATE +/–, PROG. +/–, START +/– and STOP +/–.
If you use VPS, 'VPS' must appear in the display.
Switch VPS on or off with the VPS button.

Programming is now complete.
The data has been stored in a TIMER block.
One of the squares on the right-hand side of the display lights up for each TIMER block that is occupied.

❻ Confirm the correct data with the SHOWVIEW button.



Note:
* Do you want to use programme number 'E 2' in order to record from an external source (e.g. satellite tuner)? Confirm the 'E 2' programme number displayed in step ❹ with the SHOWVIEW button.
* If 'CODE ERROR' appears in the display, the code was incorrect or incorrectly entered. Repeat the entry or end with the BEREITSCHAFT ⏻ button.
* When the programmed code is decoded, 15 minutes are automatically added to the end time. Check that this does not overlap the start of any subsequent recording. If it does, reset the end time manually.
* If 'SET CLOCK' appears in the display, the internal clock is not set. Set the clock.
* 'Daily' programming can only be used for recordings to be made from Mondays to Fridays inclusive.
* With 'Daily/Weekly' programming, the first recording must take place within a week.

How do I record from a satellite tuner?

You can also programme recordings from an external satellite tuner.

❶ Connect the tuner to the EXT 2 scart socket. Make sure that the tuner is switched on and that the correct
SAT channel has been selected.

❷ Use one of the two available programming methods to programme a TIMER block. Use programme number 'E 2' in the programming procedure for this external recording source.

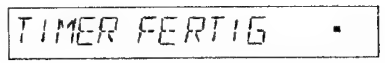
How do I check or correct a TIMER block?

❶ Press the TIMER REVIEW button on the remote control.

❷ Now press the TIMER REVIEW button as often as necessary until the TIMER block you want to check or correct appears in the video recorder display.
The TIMER blocks will appear in chronological order on the display.

❸ Now press the buttons DATE +/–, PROG. +/–, START +/–, STOP +/– to change the recording date, programme number, start time or stop time.
You can switch VPS on and off.
You can select from daily/weekly/date programming with the D/W button.

❹ Finally, press the OK button. If you have made any changes, the data will now be up to date. 'TIMER READY' will appear in he video recorder display.



Note:
* 'Daily' programming can only be used for recordings to be made from Mondays to Fridays inclusive.
* With 'Daily/Weekly' programming, the first recording must take place within a week.

Audio dubbing

❶ Press the TIMER RC button.

* With 'Daily/Weekly' programming, the first recording must take place within a week.

Audio dubbing

This function enables you to replace (dub) the sound track of an existing recording with another sound track. To do this, connect an audio source (e.g.: a CD-player) to the [AUDIO] socket.

❶ Press the [WIEDERGABE] button to locate the position at which the audio dubbing is to start.

❷ Press the [PAUSE / STO?] button.

❸ Press the **REC.MODE** button (remote control). 'DUB-PAU' will appear in the video recorder display.

❹ Press the [AUFNAHME] button.
The video recorder will start to record the sound transmitted from the audio source. The sound track is re-recorded. The sound level is controlled automatically.

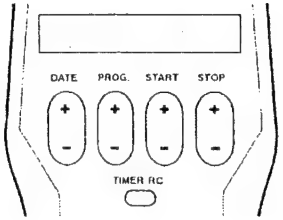
❺ Stop the recording with the [PAUSE / STOP] button.

❻ Switch off with the [BEREITSCHAFT ⏻] button.

Programming on the remote control

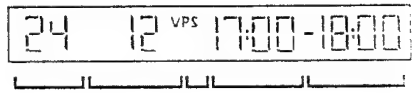
You can enter data for **one** recording **at a time** in the remote control.

The remote control display will indicate all data simultaneously. To enter the data, use the four buttons [+/−] under the display on the remote control.
Make sure that you have not loaded a cassette with erase protection.



❶ Press the [TIMER RC] button.

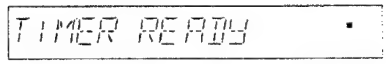
The last data you entered will appear in the remote control display. Change the data in **any** sequence you choose:



- Set the date of the recording with the [DATE +/−] button.
- Set the programme number with the [PROG. +/−] button.
- Switch the VPS on or off with the [VPS] button.
- Set the start time with the [START +/−] button.
- Set the stop time with the [STOP +/−] button.

❷ Have you set all the data correctly? Now point the remote control at the video recorder and press the [OK] button.

The data is transmitted to the video recorder. 'TIMER READY' will appear in the video recorder display to confirm that the data has been received.



Programming is now complete.
The data has been stored in a TIMER block.
One of the squares on the right-hand side of the display lights up for each TIMER block that is occupied.

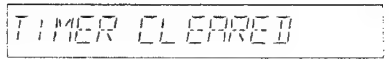
❸ If you want to programme more, start again at step ❶. The video recorder can store up to six programmes.

How do I clear a TIMER block?

❶ Press the [TIMER REVIEW] button on the remote control.

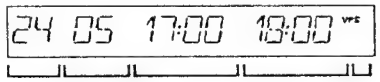
❷ Press the button [TIMER REVIEW] as often as necessary until the TIMER block you want to clear appears in the video recorder display.

❸ Press the [CLEAR] button. The TIMER block will be cleared. 'TIMER CLEARED' will appear in the video recorder display.



How can I read TXT?

1. Switch on your TV set and select the programme number you have stored for video playback.
2. Switch on the video recorder with button [STOP ■].
3. Now select on the video recorder the TV channel whose TXT pages you want to read. To do this, press button [+] or [−] or the digit buttons [0-9] on the remote control.
4. Use button [▤] on the remote control to switch on the TXT decoder. The video recorder is now receiving the TXT of the TV channel you chose. 'TXT' will appear in the video recorder display.



On the TV screen you will see the first TXT survey page, which is usually the index. The TXT information line will be included on the upper edge of the TV screen.

5. Now you can call up the TXT pages that you want to read.
   Use the digit buttons [0-9] to enter the number of the desired TXT page. You must always enter this number as three digits.

The page number you enter appears in green in the upper information line on the TV screen. After a few seconds search time, the page you wanted will appear. If you want to read another page, just enter the new page number.
You can use the coloured TXT buttons [▤] (on the remote control) to select directly the TXT page that you want to read. On the lower edge of the TV screen you will find the corresponding coloured notes.

If you want a survey of the entire range of information on offer with TXT, press button [▤]. The TXT index defined for the TV channel then appears.

6. Switch off the TXT decoder with button [▤]. You will then return to the normal TV channel.
7. Switch off the video recorder with button [STANDBY ⏻].

The automatic use of the TXT clock by the

An important note:
* When you switch on TXT, most of the other functions of your video recorder are blocked.

Can I store my 'favourite TXT pages'?

For each TV channel you can store up to four TXT page numbers, e.g. the news headlines or the daily TV programme survey. If you store the programme survey page here, programming with TXT will be much easier for you.

1. Switch on the TXT as usual with button [▤] and select the page you want to have as a 'favourite TXT page'.
2. Press button [SEL / VPS]. The TV screen will show you a survey of the 'favourite TXT pages' you have already stored. If you want to select, delete or interrupt another page number, press the corresponding coloured button [▤].
3. To conclude, press the green button [▤]. You have now stored the page numbers.
4. Return to the TXT mode with the blue button [▤].

How can I call up my 'favourite TXT pages'?

1. Switch on the TXT with button [▤]. The first favourite TXT page will appear on the TV screen.
2. Use the blue or red button [▤] to select other favourite TXT pages. You can enter the page number directly with buttons [PAUSE / STOP].
3. Press button [▤] to return to the normal video recorder mode.

To enlarge the print

❷ Switch off the video recorder with button STANDBY ⏻.

The automatic use of the TXT clock by the video recorder

Store a TV channel that transmits TXT on programme number 'P 1'. From now on, the video recorder takes the correct time from TXT.

Note:
* The date is not corrected automatically.

How can I record TXT subtitles?

❶ Switch on the TXT with button 📄 (remote control) and select the page number of the subtitles page.

❷ Then start the recording as usual with button RECORD.

Some notes:
* You can only record the subtitles from the TXT information. If you select a normal TXT page and press button RECORD, the TXT information will be deleted.
* While you are recording you cannot use TXT. You first have to interrupt the recording with button STOP ■.

Switching off TXT temporarily

You can use button 📄 on the remote control to switch off TXT temporarily. When you press button 📄 again, the TXT will appear again on the TV screen without you having to call it up.

❸ Press button 📄 to return to the normal video recorder mode.

To enlarge the print

You can use button 📄 to double the print height on the TXT screen. Thus, you can, for example, still read TXT from further away.

❶ Press button 📄 - the upper half of the page will appear enlarged on the TV screen.

❷ If you press button 📄 again - the lower half of the page will appear enlarged on the TV screen.

❸ Press button 📄 again when you want to view the whole TXT page in normal print height.

TXT turns over pages automatically:

If a TXT page takes up more space than is available on the TV screen, this page is divided into sub-pages which are automatically turned over.

❶ By pressing button HOLD ⇨ on the remote control you can stop the pages from being turned over, e.g., if you wish to take your time reading.

❷ This sub-page will remain on the TV screen until you press button HOLD ⇨ again. Then the pages are turned over automatically again.

Calling up concealed information:

Some TXT pages (e.g.: the quiz page) contain questions with concealed answers or information.

❶ Press button ? to make the concealed information appear on the TV screen.

❷ Press button ? once more to make the information disappear again.

General notes:
* There are no page numbers beginning with '0' or '9'. If you accidentally select '0' or '9' as the first digit, this error will be indicated by 'P?--' on the information line.
* If, while selecting a page number, you accidentally press a wrong digit button, you must nevertheless complete a combination of three digits. Only then can you enter the correct page number again.
* If the number of a chosen page remains green, this means that the TV channel is not transmitting this page at the moment.

* If you wish to change from one TXT channel to another, you first have to switch off the TXT decoder with button [▤].
Then select the number of the other TV channel whose TXT pages you want to see and switch on the decoder again with button [▤].

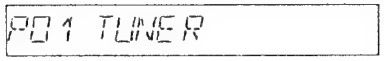
Tuner mode. Your video recorder as an extension of your TV set

You can also use your video recorder as a TV receiver (tuner). This is handy if your TV set does not have remote control or if it has fewer storage places for TV channels than the number of TV channels it could actually receive.

This is how you go about it:

❶ Switch on the TV set. Select the programme number you have earmarked for playback on the video recorder.

❷ Press the [TUNER] button on the remote control. 'TUNER' ' and a programme number will appear in the display.



❸ Choose the required programme number with the [+] or [−] button.

❹ Switch the video recorder off by pressing the [STANDBY] button when you no longer want to watch television.

Channel name display

When you are watching or recording from TV channels that transmit the VPS signal, you can display the name of the TV channel (e.g.: 'BBC1') on the TV screen.

❶ Press the [VPS] button.

Note:
* You can use this function in the Pause, Stop, Record, Programme Preset and Tuner modes.

Changing the TV standard manually

If you play back recordings made on other video recorders or if you record from an external source (such as a camcorder via the AV-Euro socket [EXT 2]), the automatic TV standard switch-over between PAL and SECAM may not always work properly.

❶ If you are recording, **first** select the standard of your recording source by pressing the [SYSTEM] button. You can also switch over **during** playback. The display will show for a few seconds:

Press once	: **'PAL'** for the PAL-B,G standard
Press twice	: **'SECAM'** for the SECAM-L standard
Press three times	: **'MESECAM'** for the MESECAM standard

❷ If you interrupt a recording or playback by pressing the [STOP ■] button, the video recorder switches back to 'automatic'.

View Mode

Switching the built-in modulator on or off

In the last section we talked about interference that

back to 'automatic'.

View Mode

When you connect another appliance to the EXT 2 socket you will be able to use the following additional functions. The appliance can be a second video recorder, a decoder, a satellite receiver or a CD video player.

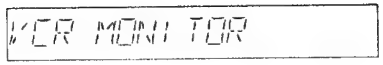
- Thus, if the second appliance transmits a control signal, for example, during playback, the (switched on) video recorder will recognize it and automatically switch to 'View Mode'.
  You can switch View Mode on and off with the MONITOR button.
- Even when the video recorder is switched off, the AV-Euro connection from the TV set to the second appliance is still operational.

Note:
* If you have selected the programme number 'E 1' or 'E 2', the video recorder cannot switch over to View Mode. This also applies to programme numbers for which the decoder function has been activated.
* The function reacts **only** if your TV set also has this switch-over function and you are using an AV-Euro cable to connect your video recorder to the TV set.

TV monitor function

Switch your TV set to the 'AV' programme number (Audio/Video input) by pressing the MONITOR button. This enables you to see the picture from the video recorder on the TV screen. Your video recorder must be switched on.

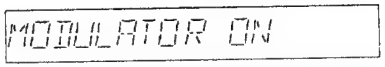
'VCR MONITOR' will appear in the display for a few seconds. Press the button again to switch the monitor function off again.



Note:
* The monitor function will respond **only** if your TV set also has this switch-over function and you are using an AV-Euro cable to connect your video recorder to the TV set.
* The monitor button does not respond during playback.

Switching the built-in modulator on or off

In the last section we talked about interference that could occur on the television. If you **cannot eliminate** picture or sound interference using the above method you can switch off the built-in modulator.
You can only do this if you have connected the video recorder to the TV set using an AV-Euro cable.



❶ Press the EJECT ▲ and PAUSE / STOP ❚❚■ buttons on the video recorder simultaneously. The switch's current position will appear in the display as 'MODULATOR ON'.

❷ Press the EJECT ▲ and PAUSE / STOP ❚❚■ buttons simultaneously again for more than five seconds. This will switch to 'MODULATOR OFF'. Switch the modulator back on in the same way.

2. SERVICE TEST PROGRAM

2.1.Introduction

A service test program has been included in the software program of the micro processors. This service test program is divided into four operating modes:

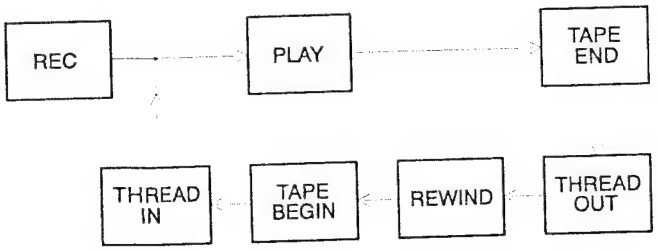
- Checking the tape drive functions/control µP mask number
- Checking the sensors in the tape drive+tape drive status/deck µP mask number
- Operating hours meter/console µP mask number
- Continous running test

2.2 Calling the service test program

Simultaneous pressing the "STOP" key on the remote control and the "PLAY" key on the unit for at least 5 seconds calls the service test program. The display will then show the information on the display. (see Fig. 1)
The service test program can be called from any operating state of the VCR other than the station search, install, set clock and cassette select. While it is operating in the service mode, the VCR remains fully operational for all tape drive functions. Pressing the "STAND-BY" key or disconnecting the unit from the mains switches the test program off.

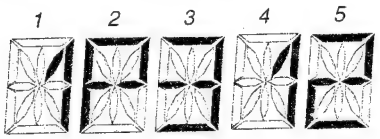
2.3. Continuous running

While in the service test program the unit can be submitted to continuous running. For this purpose, insert a cassette and select one of the following modes "PLAY", "REC" or "REWIND". The functions are then carried out continuously. This test serves to find intermittent errors. The last occuring error is stored in the EEPROM (the stored error is saved even in case of mains failure). The continuous running test is terminated by quitting the service test program.



2.7 Indication of the µP mask numbers

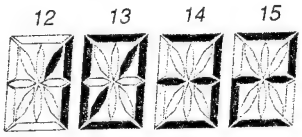
The indication is five-figured, numbers 1, 2, 3, 4, 5.



Digit 1: Deck µP mask number (NTD2-*1*U)
Digit 2: Mask indication
Digit 3: Family (*3* ... Nora 3)
Digit 4: Control µP mask number (NDCP1-*1*U)
Digit 5: Display µP version (only TXT)

2.5. Operating hours meter

The tape counter disply then indicates the number of hours the head disc has been running.



2.6. Monitoring the tape deck functions

If there is no bellow mentioned signal, the unit tries to move the lift to "EJECT".

2.6.1. Threading in and threading out duration

The sensor signal used to check the threading in and out duration is (FTA) obtained from the butterfly sensor which monitors the revolutions of the threading motor.

2.6.2. No rotation of the left or the right reel disc

The signals sensed to check rotation are the tachometer signals from the left (WTAL) and the right (WTAR) reel disc.

2.6.3. No rotation of the head disc motor

The PG/FG signal is used for this disc rotation. It is derived from the e.m.f. of the non-current-carrying coil of the head disc motor and indicates the position of the head disc.

2.6.4. Error of the capstan motor

For this control the FGD-signal is used.

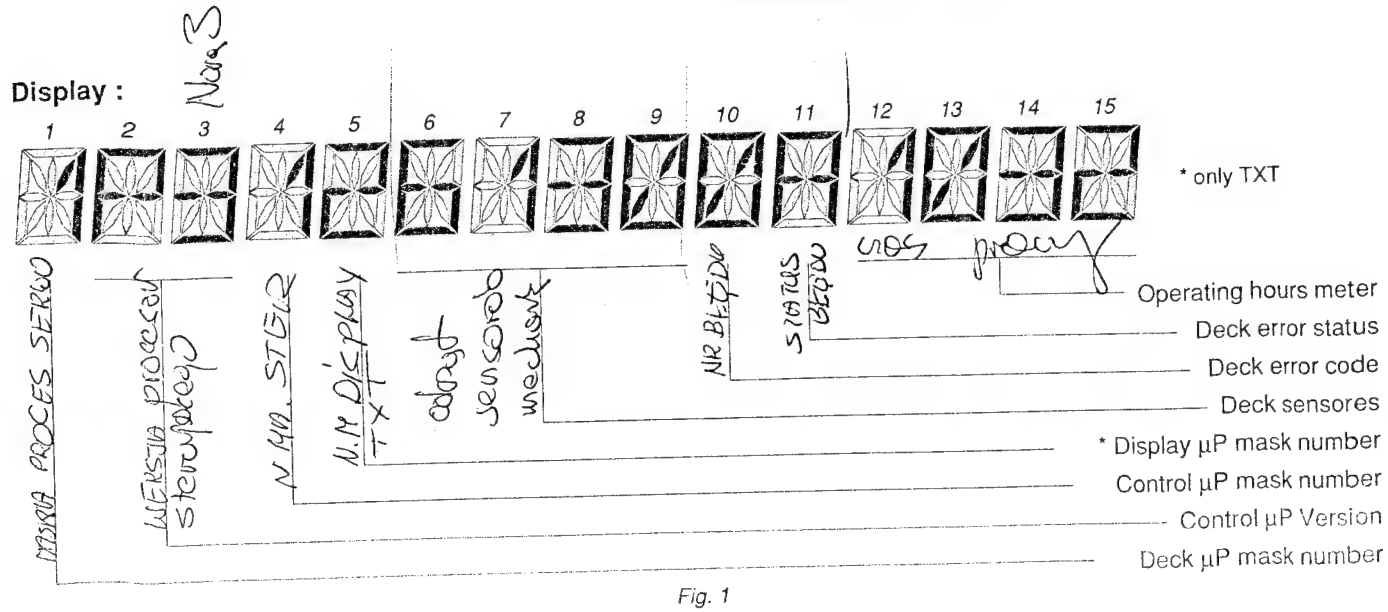


Fig. 1

2.7 EEPROM

2.7.1 Erasing the EEPROM

- Remove the mains supply to the VCR.
- Press the "WIND", "REWIND" and "DOWN" keys simultaneously and while the keys are held down reconnect the mains supply.

This erases and initializes all data in the EEPROM (with the exception of deck parameters and options), including the TV stations programmed by the customer. The internal processor RAM is also erased.

2.7.2 "Studio like picture control" compensation (only N4)

If a new EEPROM has to be installed during a repair, it will have to be re-initialised for the "studio like picture control" feature.

- Feed in video signal via the SCART socket or the aerial.
- Insert a cassette (not a SVHS tape)
- Call up the service test program by pressing the STOP button on the remote control and the PLAY button on the machine simultaneously for at least 5 seconds. (A message such as the following will appear on the display : See fig. 1)
- Press first the PLAY button on the remote control and the RECORD button on the machine simultaneously. The machine will thread in the tape and make a recording in SP (about 4 seconds) and then another recording in LP (about 4 seconds).
- When compensation has been completed the VCR will rewind, play back the recording, and switch to STAND BY. (In the event of an error the cassette will be ejected).

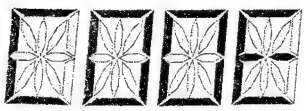
2.7.3 Initialising the EEPROM

If a new EEPROM has to be installed during repair work, it will have to be re-initialised.

Initialisation :

Call up the servicing test program by simultaneously pressing the STOP button on the remote contro and the PLAY button on the video recorder for at least 5 seconds. (A message such as in Fig. 1 will appear in the display.)

When you press the STOP button on the remote control and the PLAY button on the video recorder again, the following display will appear :



Enter a three-figure code (see code table) to set the right options. Confirm the code input by pressing the OK or the PROGRAMME PRESET or STORE or the CODE button. If you make an incorrect entry the video recorder will switch to stand-by.

CODE TABLE FOR OPTIONS :

not turbo	16*9	audio dubbing synchro edit	follow me	gemstar *	showview *	2 scart	CODE
0	0	0	0	0	0	0	20
0	0	0	0	0	0	1	154
0	0	0	0	0	1	0	288
0	0	0	0	0	1	1	119
0	0	0	1	0	0	0	183
0	0	0	1	0	0	1	14
0	0	0	1	0	1	0	148
0	0	0	1	0	1	1	570
0	0	1	0	0	0	0	39
0	0	1	0	0	0	1	173
0	0	1	0	0	1	0	4
0	0	1	0	0	1	1	138
0	0	1	1	0	0	0	202
0	0	1	1	0	0	1	33
0	0	1	1	0	1	0	167
0	0	1	1	0	1	1	589
0	1	0	0	0	0	0	58
0	1	0	0	0	0	1	192
0	1	0	0	0	1	0	23
0	1	0	0	0	1	1	157
0	1	0	1	0	0	0	221
0	1	0	1	0	0	1	52
0	1	0	1	0	1	0	186
0	1	0	1	0	1	1	305
0	1	1	0	0	0	0	77
0	1	1	0	0	0	1	211
0	1	1	0	0	1	0	42
0	1	1	0	0	1	1	176
0	1	1	1	0	0	0	240
0	1	1	1	0	0	1	71
0	1	1	1	0	1	0	205
0	1	1	1	0	1	1	324
1	0	0	0	0	0	0	96
1	0	0	0	0	0	1	230
1	0	0	0	0	1	0	61
1	0	0	0	0	1	1	195
1	0	0	1	0	0	0	259
1	0	0	1	0	0	1	90
1	0	0	1	0	1	0	224
1	0	0	1	0	1	1	343
1	0	1	0	0	0	0	115
1	0	1	0	0	0	1	249
1	0	1	0	0	1	0	80
1	0	1	0	0	1	1	214
1	0	1	1	0	0	0	278
1	0	1	1	0	0	1	109
1	0	1	1	0	1	0	243
1	0	1	1	0	1	1	362
1	1	0	0	0	0	0	134
1	1	0	0	0	0	1	268
1	1	0	0	0	1	0	99
1	1	0	0	0	1	1	233
1	1	0	1	0	0	0	297
1	1	0	1	0	0	1	128
1	1	0	1	0	1	0	262

not turbo	16*9	audio dubbing synchro edit	follow me	gemstar *	showview *	2 scart	CODE
1	1	0	1	0	1	1	381
1	1	1	0	0	0	0	153
1	1	1	0	0	0	1	287
1	1	1	0	0	1	0	118
1	1	1	0	0	1	1	252
1	1	1	1	0	0	0	13
1	1	1	1	0	0	1	147
1	1	1	1	0	1	0	281
1	1	1	1	0	1	1	400
THE GEMSTAR REPAIR CODE MAY ONLY BE USED ON GEMSTAR MACHINES ! (COPYRIGHT ON MODEL PLATE)							
0	0	0	0	1	0	0	253
0	0	0	0	1	0	1	84
0	0	0	0	1	1	0	218
0	0	0	0	1	1	1	49
0	0	0	1	1	0	0	401
0	0	0	1	1	0	1	535
0	0	0	1	1	1	0	366
0	0	0	1	1	1	1	500
0	0	1	0	1	0	0	272
0	0	1	0	1	0	1	103
0	0	1	0	1	1	0	237
0	0	1	0	1	1	1	68
0	0	1	1	1	0	0	420
0	0	1	1	1	0	1	554
0	0	1	1	1	1	0	385
0	0	1	1	1	1	1	519
0	1	0	0	1	0	0	291
0	1	0	0	1	0	1	122
0	1	0	0	1	1	0	256
0	1	0	0	1	1	1	87
0	1	0	1	1	0	0	439
0	1	0	1	1	0	1	573
0	1	0	1	1	1	0	404
0	1	0	1	1	1	1	538
0	1	1	0	1	0	0	7
0	1	1	0	1	0	1	141
0	1	1	0	1	1	0	275
0	1	1	0	1	1	1	106
0	1	1	1	1	0	0	458
0	1	1	1	1	0	1	592
0	1	1	1	1	1	0	423
0	1	1	1	1	1	1	557
1	0	0	0	1	0	0	26
1	0	0	0	1	0	1	160
1	0	0	0	1	1	0	294
1	0	0	0	1	1	1	125
1	0	0	1	1	0	0	477
1	0	0	1	1	0	1	308
1	0	0	1	1	1	0	442
1	0	0	1	1	1	1	576
1	0	1	0	1	0	0	45
1	0	1	0	1	0	1	179

not turbo	16*9	audio dubbing synchro edit	follow me	gemstar *	showview *	2 scart	CODE
1	0	1	0	1	1	0	10
1	0	1	0	1	1	1	144
1	0	1	1	1	0	0	496
1	0	1	1	1	0	1	327
1	0	1	1	1	1	0	461
1	0	1	1	1	1	1	595
1	1	0	0	1	0	0	64
1	1	0	0	1	0	1	198
1	1	0	0	1	1	0	29
1	1	0	0	1	1	1	163
1	1	0	1	1	0	0	515
1	1	0	1	1	0	1	346
1	1	0	1	1	1	0	480
1	1	0	1	1	1	1	311
1	1	1	0	1	0	0	83
1	1	1	0	1	0	1	217
1	1	1	0	1	1	0	48
1	1	1	0	1	1	1	182
1	1	1	1	1	0	0	534
1	1	1	1	1	0	1	365
1	1	1	1	1	1	0	499
1	1	1	1	1	1	1	330

*)

gemstar=0 ... gemstar off

gemstar=1, show view=1 ... gemstar on (show view)

gemstar=1, show view=0 ... gemstar on (video plus)

2.8 Explanation of the error codes (see fig. 2 & 4)

The last error code that occurred is stored in the EEPROM and is saved even if the unit is disconnected from the mains. To erase this error code, press the "CLEAR" key on the remote control while in the service mode.

2.9 Tape deck status (see fig. 3)

The signal (FTA) from the butterfly sensor indicating the revolutions of the threading motor is used in conjunction with the init switch to identify the position of the tape deck. A check of the deck status is given by the two left digits of the display.

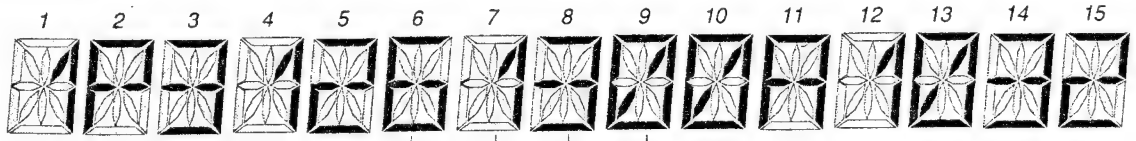
Deck error code			
	no error		error of right tacho reel
	threading error		blocked headdrum
	no capstan		not used
	teared tape		not used
	error of left tacho reel		not used

Fig. 2

Deck error status			
	Stand by		Reverse
	Eject on		Fast forward
	Stop		Fast reverse
	Still		Slow
	Play		Slow
	Tuner		Slow
	Record		Tuner eject
	Play & Tracking		Stand by eject
	Scan forward		Index next
	Scan reverse		Index previous
	Wind		not used
	Rewind		not used
	Pause		not used

Fig. 4

Display :



Tape deck status		
Eject		...
Stop threaded out		...
Play position		...
Play reverse		...

Fig. 3

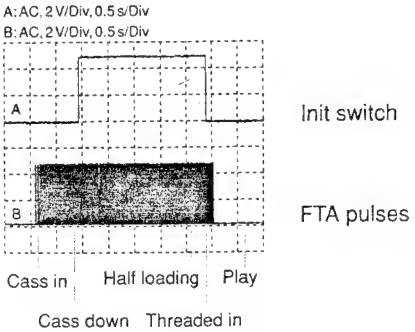
Tape deck sensors	
Left winding tacho	(+1/-1)
Init switcher	(+2/-2)
Threading tacho (FTA)	(+4/-4)

Tape deck sensors	
End of tape detection	(+1/-1)
Begining of tape detection	(+2/-2)
Record protection	(+4/-4)
Right winding tacho	(+8/-8)

Fig. 5

Function of the Init switch:

The diagram shows the function of the Init switch dependent on the tape deck position.
The number of FTA pulses is important for the position of the tape deck.



2.10. Checking the sensors (see fig. 3 & 5)

The indication of the deck sensor control is four-figured.
The output of the bits on the display is hexadecimal (0, 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9 , A , B , C , D , E , F). Several sensors are indicated per bit. If one of these sensors is activated, the value will change by the increments described below, e.g. tape end (TAE) by +1 or -1.

SERVICING OF SMDs
(Surface Mounted Devices)

1. General cautions on handling and storage.

Oxidation on the SMDs terminals results in poor soldering. Do not handle SMDs with bare hands.

Avoid for storage places that are sensitive to oxidation such as places with sulfur or chlorine gas, direct sunlight, high temperatures or a high degree of humidity. As a result the capacitance or resistance value of the SMDs may be affected.

Rough handling of circuit boards containing SMDs may cause damage to the components as well as the circuit boards. Circuit boards containing SMDs should never be bent or flexed. Different circuit board materials expand and contract at different rates when heated or cooled and the components and/or solder connections may be damaged due to the stress. Never rub or scrape chip components as this may cause the value of the component to change. Similarly, do not slide the circuit board across any surface.

2. Removal of SMDs

Heat the solder (for 2-3 seconds) at each terminal of the chip. Small components can, by means of litz wire and a limited horizontal force, be removed with the soldering iron. They can also be removed with a solder sucker (see Fig. 1A) or

While holding the SMD with a pair of tweezers take it off gently using the soldering iron's heat applied to each terminal (see Fig. 1B).

Remove the excess solder on the solder lands by means of litz wire or a solder sucker (see Fig. 1C).

Caution on removal :

When handling the soldering iron, use suitable pressure and be careful.

When removing the chip, do not use undue force with the pair of tweezers.

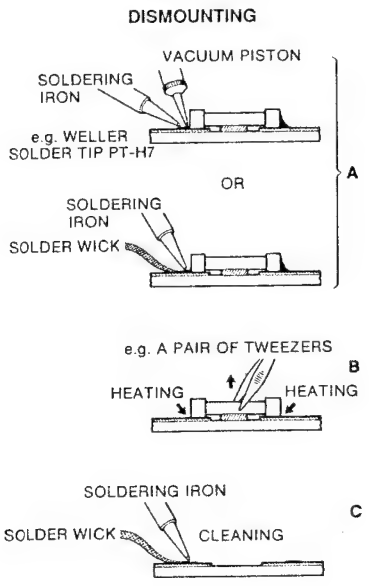


Fig. 1

The soldering iron to be used (approx. 30 W), must preferably be provided with a thermal control (soldering temperature about 225 to 250°C).

The chip, once removed, must **never** be used again.

3. Attachment of SMDs

Locate the SMD on the solder lands by means of tweezers and solder the component at one side. Ensure that the component is positioned well on the solder lands (see Fig. 2A).

Next complete the soldering of the terminals of the component (see Fig. 2B).

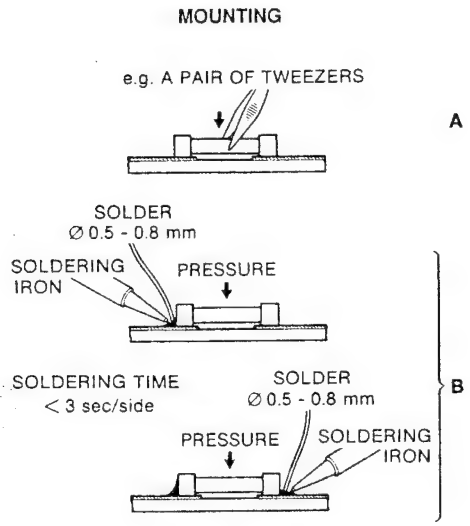


Fig. 2

Caution on attachment :

When soldering the SMD terminals, do not touch them directly with the soldering iron. The soldering must be as quick as possible; care must be taken to avoid damage to the terminals and the body itself.

Keep the SMD's body in contact with the printed board when soldering.

The soldering iron to be used (approx. 30 W) must preferably be provided with a thermal control (soldering temperature about 225 to 250°C).

Soldering should not be done outside the solder land.

Soldering flux (of rosin) may be used but should not be acidic.

After soldering, let the SMD cool down gradually at room temperature.

The quantity of solder must be proportional with the size of the solder land. If the quantity is too great, the SMD might crack or the solder lands might be torn loose from the printed board (see Fig. 3).

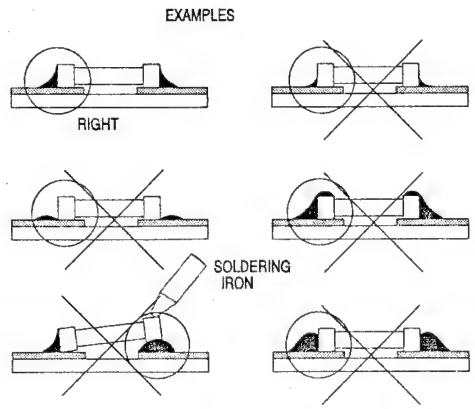
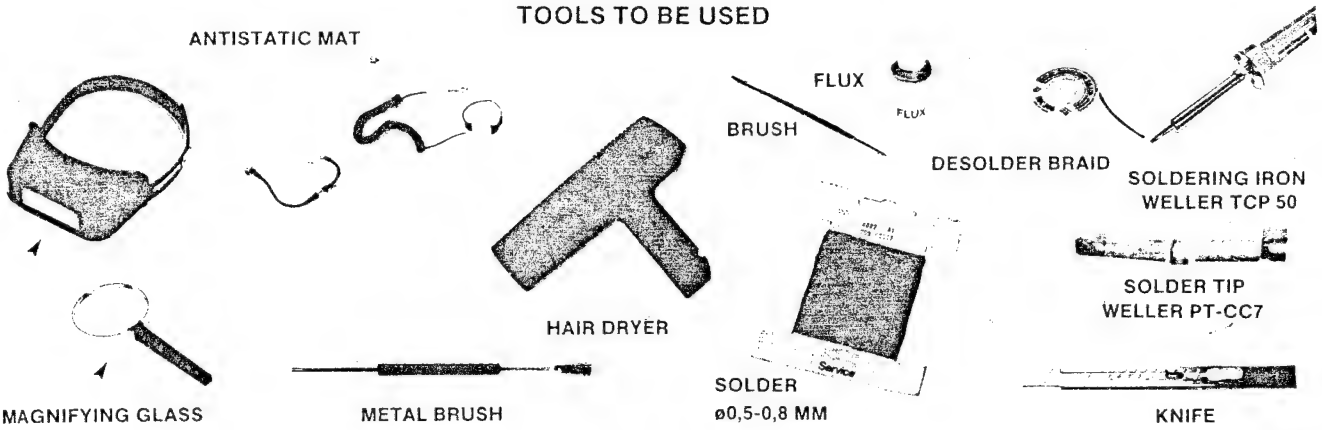


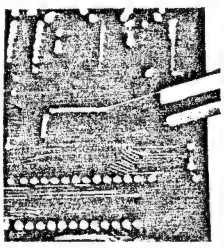
Fig. 3

FLATPACK REPLACEMENT

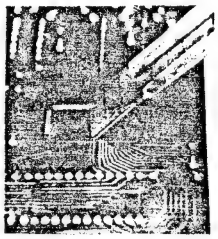
TOOLS TO BE USED



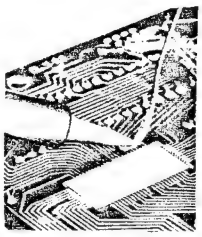
DISMOUNTING



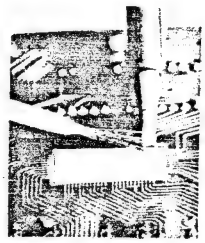
CUTTING
THE LEADS



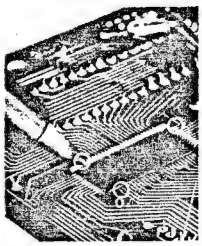
WRONG
TRACKS WILL
BE DAMAGED



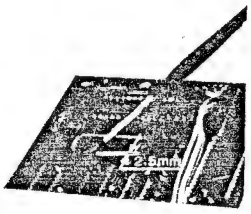
CLEANING
THE TRACKS



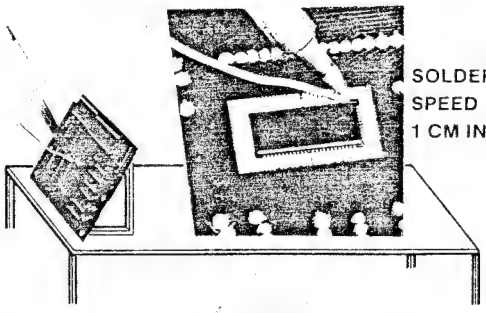
MOUNTING



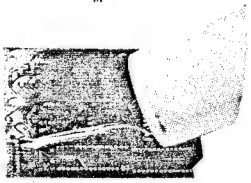
FIXING IC
AT THE CORNERS



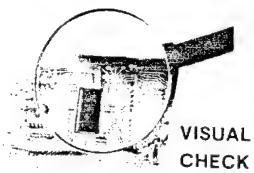
APPLYING FLUX



SOLDERING:
SPEED
1 CM IN 5 SEC.

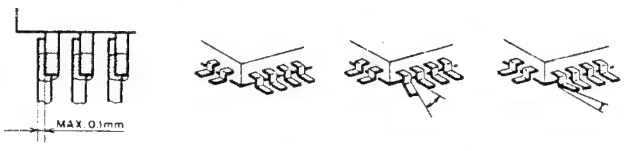


DRYING



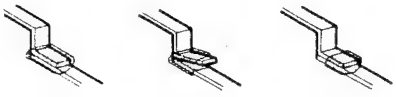
VISUAL
CHECK

ALIGNING THE LEADS



RIGHT WRONG WRONG

SOLDERING



RIGHT WRONG WRONG

REMOVAL OF CASE COMPONENTS AND SERVICE POSITIONS OF PRINTED CIRCUIT BOARDS

1. The casing cover

Dismontling :

- Unscrew the screws A, B, C, D, E, F and G (see fig. 1).
- Pull back the casing cover for appr. 1 cm, and when the side panels are being slightly pressed outward, the cover can be taken off.

Assembly :

- Place the front groove tightly on the front panel.

Then carry out the assembly in reverse order.

2. The bottom plate

- Place the unit with the bottom side up.
- The bottom plate can be lifted off by releasing the six snap hooks (see fig. 2).

3. The front panel

- Remove the casing cover (see point 1).
- Press the two snap hooks on the left and the two snap hooks on the right at the front outward.
- Press the front at the top slightly forward, release the 3 snap hooks at the bottom side of the front and pull forward (see fig. 3).

Note :

For assembly, the front panel has to be slipped on in parallel to the control print. For this purpose, the lever which serves to open the lift flap has to be pushed into the flap guide.

4. Power supply MSM, NSM

The MSM, NSM can be removed from the unit by releasing the two snap hooks (see fig. 4).

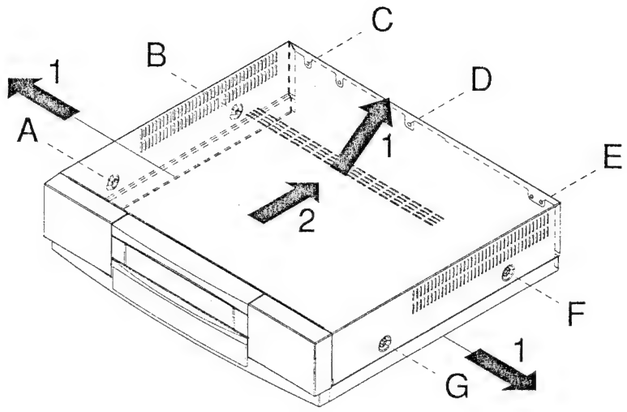


Fig. 1

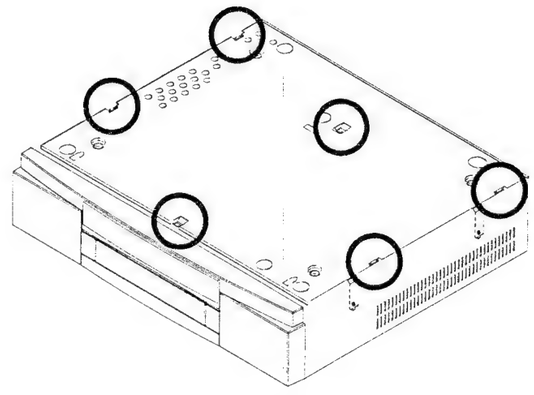


Fig. 2

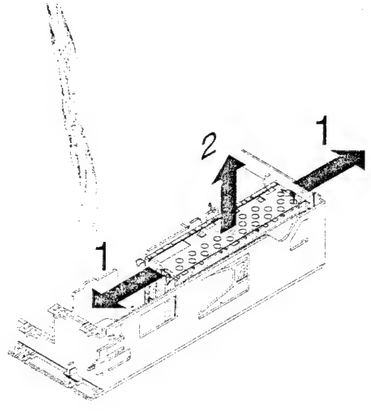


Fig. 4

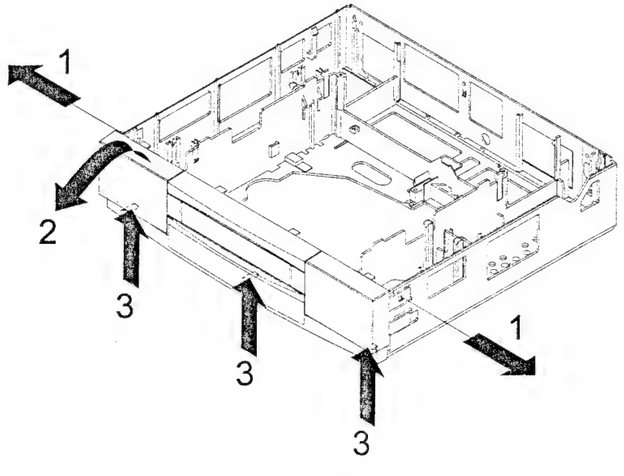


Fig. 3

5. Control print MDC, NDC

- Remove the front panel see point 3.
- The control print can be removed by releasing the snap hooks (see fig. 5).

6. Family board MFB, NFB

- Release the 4 snap hooks (see fig. 6).
- Now lift the MFB, NFB turn it into the service position (see fig. 7) and place it into the slots provided.

7. The Tape deck

- Remove front panel and cover, see point 1 and 3.
- Unlock the 2 lift locks and manually move the lift 5 cm to the rear.
- Unscrew the 3 screws V,R,S (see fig. 8).
- The whole tape deck can now be removed from the frame.

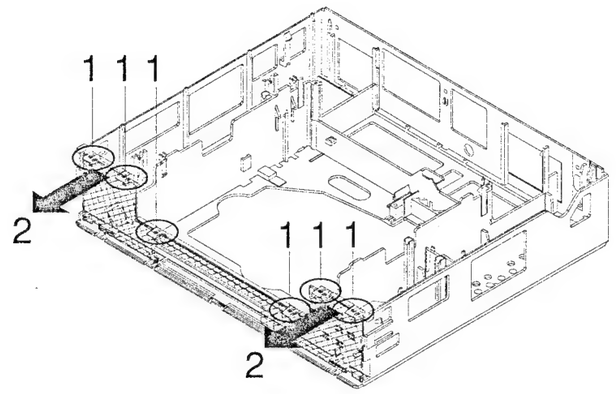


Fig. 5

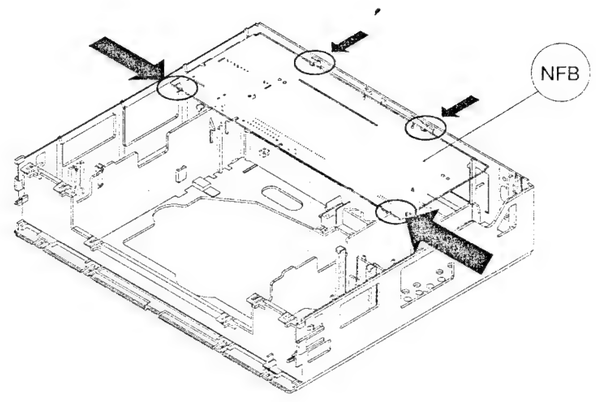


Fig. 6

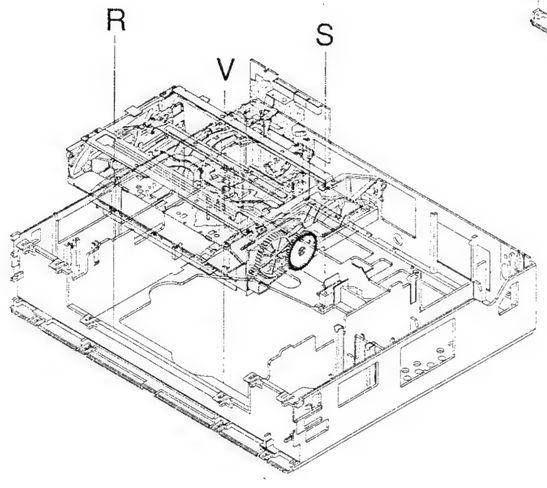


Fig. 8

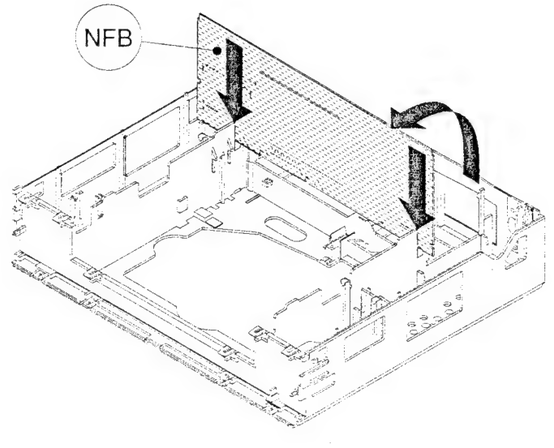


Fig. 7

LIST OF ABBREVIATIONS

+12A .....+12V analog supply
+14A .....+14V analog
+14M1 .....+14V for capstan and threading motor
+33V .....+33V Tuning supply
+5A (5VA) .....+5V analog for I/O SE and LHA
+5D .....+5V digital after fuse
+5V2D .....+5V digital
+5VAS .....+5V analog after fuse
+8M1 .....Switched capstan motor supply
-28V .....-28V for display
-7V .....-7V for In/Out
5VPB .....+5V Playback
8SC1 .....Scart 1 pin 8
8SC2 .....Scart 2 pin 8
AE12 .....Audio from scart 1 or 2
AEH12 .....Audio erase head
AFCA .....Automatic frequency control analog
AFCD .....Automatic frequency control digital
AFV .....Audio mono from frontend
AGC .....Automatic gain control
AIN1 .....Audio from scart 1
AMLP .....Audio mono linear playback
AMLR .....Audio mono linear record
AOUT1 .....Audio output scart 1
APH .....Audio playback head
ARH .....Audio record head
BLANKING .....Blanking-pulse RGB-loopthrough
BLUE .....Blue signal scart 1/2
CAP .....Capstan on
CHRS .....SECAM record-current
CIN .....SECAM chroma-signal
CKPAL .....Colour-killer PAL
CLKD1 .....Serial bus
CREV .....Capstan reverse
CROT .....Colour rotation
CSI .....Colour system information
CSYNC .....Sync impulse
CTL12 .....Control track signal
CVBS .....Videosignal
DATD1 .....Serial bus
DO .....Drop-out compensation ON
ENVC .....Envelope comparator
ES2 .....External source 2
ESPBH .....Ext.source and PB = high
FFP .....Feature frame pulse
FG .....Position info capstan
FGD .....Position info capstan digital
FMPV .....FM playback video signal
FMR .....Luminance record-current
FMRV .....FM record video signal
FP .....Full page
FP_PAL .....Full page PAL
FSC .....Colour subcarrier
FTA .....Threading tacho
FTAD .....Threading tacho digital
GAA .....Ground analog audio
GAV .....Ground analog video
GNDA .....Ground analog
GNDD .....Ground digital
GNDM1 .....Ground capstan motor
GNDM2 .....Ground head drum motor
GREEN .....Green signal scart 1/2
H/2 .....Half line frequency on
HEHI/HELO .....Displaytube heater HI LO
HMO .....Head drum motor
HP1 .....Head pulse video (audio)
HSC .....Head select control
I/R .....Init + record switch
ICSI3 .....Inverse colour system information
ILED .....Inverse LED-tower supply
INIT .....Deck switch
INT .....Interrupt for display µP
IPAL .....Inverse playback audio linear
IPBV .....Inverse playback video
IREC .....Inverse record audio linear
LED .....LED tower supply
LP .....Longplay on
MEH1 .....Main erase head
MEH2 .....Main erase head GND
MES .....Middle east SECAM
MODON .....Modulator ON
MTA .....Mute audio
NC .....Not connected
PAL .....PAL-standard
PG/FG .....Scanner position/-speed
PIN10 .....Scart 1 pin 10
POR .....Power on reset
POS .....Position pulse head disc
PSS .....PAL or SECAM-L
RECP .....Record protect
RED .....Red signal scart 1/2
REEL .....Scanner control
REV .....Record video
SB1 .....SECAM band 1
SCL SDA .....I²C bus
SCRTV .....Scrambled TV
SEC .....SECAM-Standard
SEL-V/H .....Syncpulse selection
SH1/2 .....Video heads
SHC .....Video heads common
STR .....Shiftregister strobe
SYNC .....Control track pulse
TAE .....End of tape detection
TAS .....Beginning of tape detection
THIO .....Threading in/out signal
TMO .....Threading motor ON
TMO 12 .....Threading motor
TRIV .....Tracking information video
TXTCVBS .....Videosignal
V/H SYNC .....Frame or linepulse
VBS .....Video to SE
VE12 .....Video from scart 1 or 2
VFV .....Video from frontend
VIDOUT .....Video out
VOUT1 .....Video output scart 1
VSB .....Video from SE
VTX .....Video output TXT
W/R .....Control track write/read
WIND .....Wind/Rewind signal
WTL .....Wind tacho left
WTLD .....Wind tacho left digital
WTR .....Wind tacho right
WTRD .....Wind tacho right digital

CIRCUIT DESCRIPTIONS

KEYBOARD CONTROL UNIT

The microcomputer IC7101 is the heart of the keyboard control unit and takes over the following functions with the corresponding function groups :

- Evaluation of the keyboard matrix.
- Decoding of the remote control commands from the infrared receiver IC7103.
- Quartz clock
- Integrated RAM for storing the timer data.
- Driving the display data communication between
- Bi-directional serial interface for the keyboard control computer and the sequence control computer
- I^2C bus interface (SDA Pin 79, SCL Pin 23) to the EEPROM, IC7412, on the chassis board. It is also used as a serial data bus output in connection with STROBE Pin 27.
- Generation of the tuner tuning voltage by pulse-width modulation at Pin 80 (5V level) for coarse tuning with 8-bit resolution (VST-sets).
- Generation of the tuner fine tuning voltage with 6-bit resolution and band selection (2 bits) in connection with the serial interface SDA, and STROBE.
- The drifting of the tuner or the aerial signal generates the AFC control voltage in the front end circuit on the chassis board. This voltage is supplied to Pin 18 and the keyboard control computer readjusts the tuner tuning voltage.
- In the case of power failures < 7h the 0.22 F gold capacitor C2999 at Pin 33 supplies the clock and the RAM. The diode D6099 prevents C2999 from discharging. During this period a LOW level exists at Pin 2 so that further functions of the IC are switched off by the system quartz Q1001 at Pin 13 / 14.

SWITCH MODE POWER SUPPLY MSM, [NSM]

The power supply is designed for two alternative layouts (MSM, NSM).
In both versions, the power transistor can either be integrated in the driver IC (SPH 4690) or it can be external (TDA 4605). Either the MSM or the NSM can be installed. This description refers to the MSM version with an external power transistor (TDA 4605). Components in square brackets (e.g. [3619]) refer to the NSM version.

Typical data :

Mains voltage:	175[196] - 265[265] V_{rms} / 45-65 Hz
Max. power:	40 W
Switching frequency:	20[30]-120[220] kHz
all outputs are short circuit protected	
efficiency 78% at max. load	

Function description (blocking oscillator principle) :

During the forward phase energy is transferred from the mains into the transformer. This energy is then supplied to the load during the off-time of the switching transistor. By control of the switch-on time the energy which is transferred in each cycle is regulated so that the output voltages are independent of load or input voltage variations. The power transistor is controlled by the by the integrated circuit TDA4605[Y7005/7007].

Description of different load-conditiones :

NO LOAD :
The SMPS works in **burst mode** (polling operation mode). That means,it will start up. After some cycles the SMPS is switched off because the output-voltage becomes too high. After the output-voltage has been reduced the SMPS will start up again

REGULATION-RANGE :
The switching frequency is reduced with increasing load. The duty cycle is mainly controlled by the mains voltage. The output-voltage is not very much load controlled.

POINT OF REVERSAL :
At this point of the output characteristics the transferred power is at maximum

OVERLOAD:
The SMPS also works in **burst mode**. The energy in each cycle is limitted so that the output voltage is reduced.

Circuit description :

C2114[2030] becomes charged via R3112[3052, 3054, 3056, 3058] and R3119 and provides the supply for the start-up phase of IC7110[Y7005/Y7007]. After this start-up phase the supply is provided by the transformer's winding 3-4[1-9] via R3127[6027], D6115. BUZ90A[Y7007]/[7035extern!] is the switching transistor of the SMPS. The inductivity of the primary winding 6-9[1-9] determine the system frequency of the circuit.
During forward phase the switching transistor is conductive, and current will flow from the positive supply at pin 6 through the transformer's primary winding and the transistor to ground. As the positive voltage at pin 6[7] of the transformer is constant, the current will increase linearly and create a ramp dependent on the mains voltage and the inductance of the primary winding. A certain amount of energy is stored in the transformer in the form of a magnetic field. The polarity of the voltages at the secundary windings are such that the diodes are non-conducting. Pin 2[2] of the IC sources a constant current during the switch on time. This current charges C2118[2015] and creates a sawtooth voltage which represents the primary current. At the same time the voltage is checked and the switching transistor is turned off when the voltage reaches a certain value which is dependent on the regulating voltage on pin 1[1]. The values of C2118[2015] and R3122[3011] are chosen to ensure that the transformer core cannot become saturated.
When the switching transistor is switched off energy is no longer supplied to the transformer. The inductance of the transformer now tries to maintain the current which has been flowing through it at a constant level (v=L*di/dt). The polarity of the voltage from the transformer therefore becomes reversed. This results in a current flow through the transformer's secondary winding via the diodes and electrolytic capacitors and the load. This current is also ramp shaped (but decreasing).
When the whole of the energy stored in the transformer has been supplied to the load and the magnetic field has disappeared, the voltage from the secondary windings falls bellow the output voltage - which is held constant by the electrolytic capacitors - plus the threshold voltage of the diodes. The current in the secondary winding therefore ceases. At this point the drain-source voltage of the switching transistor is not yet zero because capacitor C2120 contains a certain charge. This charge will start a sine-shaped ringing together with the transformer's self-induction. When the sine-wave passes through zero IC4605[Y7007]/[7005, Pin8] detects this at pin 8[18]. The switching transistor is now switched on again and a new cycle starts.
Regulation of the SMPS is done by altering the conduction time of the switching transistor so that either more or less energy is transferred from the mains into the transformer. The control information is derived from the reference component 7253[7085] which monitors the output voltage of the SMPS. The result is fed to pin 1[1] of the TDA4605[Y7007]{[7005] via an opto-coupler for electrical isolation. The TDA4605[Y7007]{[7005] compares the voltage against an internal reference. The resulting value shifts the reference with which the voltage at pin 2[2] (the image of the primary current) is compared.
IC7253[7085] is a reference-component with an internal 2,4[2,5] V reference voltage and a nominal/ actual-value compare circuit.
C2116, R3129, R3130[3040, 3042, 3044, 2040] and D6114[6040] from a snubber network which limits the peak voltage at switch-off.

The ringing seen in both voltages and currents is caused by stray selfinductances in the transformer. Therefore a passage through zero at pin 8[18] will be ignored after T7135[Y7007]/[7035 extern!] has been switched off (4[4] µs internally fixed). In addition R3125 and C2119 suppress over-shoots.
The voltage of pin 3[3] of TDA4605[Y7007]/[7005] is required for the point of reversal current which is an additional correction current for capacitor C2118[2015]. This current shortens the on-time of T7135[Y7007]/[7035 extern!] by charging C2118[2015]. The point of reversal is also stable at higher mains voltage.
Pin 7[17] is an option. By applying C2115[2023] the start-up phase will be carried out with shortened pulses so that the switching frequency is outside the audibility range.
On the secondary side there are 5 voltages present, rectified by D6201-D6209[6155-6180] and filtered by C2201-C2215[2102-2185]. In some cases two electrolytic capacitors in parallel are used to increase the ability to handle pulse currents.
Items 5203-5210[Y5123-5184] are RF-filter coils which block disturbances caused by clock frequencies of µPs.
The circuit around coil 5103 is a mains filter.

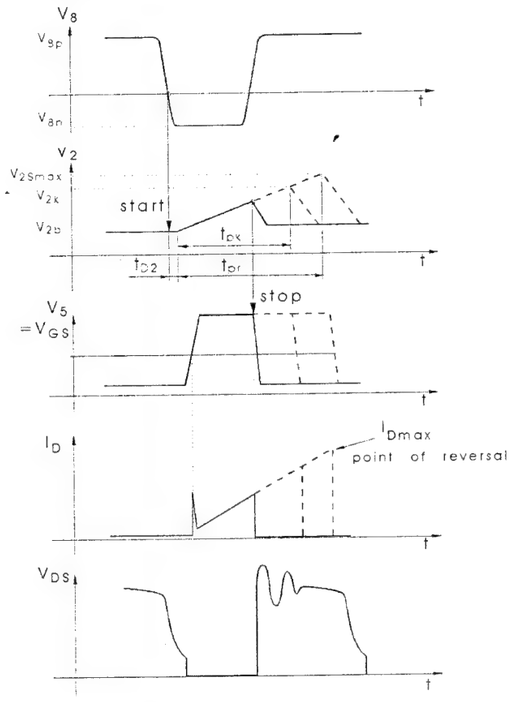


Fig. 1

Description of the "start-up-phase" :

After mains connection, at moment t0 following voltages at the pins of TDA4605[Y7007]/[7005] are increasing: (see Figure 2)

- V_6 according to half wave charge via R3112,R3119[3058,3056,3054,3052]
- V_2 rising to V_{2max} (typical 6,6[6,6] V)
- V_3 rising to the fixed value of voltage divider R3121, R3123[3005, 3007]

Current consumption in this case is 1,6[0,8] mA. The internal reference voltage is switched on at moment t1 (V_6=V_{6E}). Current consumption increases to 12[12] mA max.
The primary current to voltage converter regulates V_2 at V_{2B} and at the moment t_5-t_6 a start pulse is generated.
Feedback at pin 8[18/8] starts the next pulse and so on.
All pulses, start-pulse included, are pulse width controlled by the regulation voltage at pin 1[1]. This voltage is in accordance with the "case of short circuit". Start up is realized by "short circuit pulses" which are extended depending on the regulation voltage.

At the moment t_2 the maximum pulse width is present (V_2=V_{2Smax}) - TDA4605[Y7007]/[7005] is now in "point of reversal mode". V_2 peaks decrease rapidly because the circuit is inside the regulation range. The regulation-loop is locked.
If V_6 drops below limit value V6min before point of reversal is reached, start up will be stopped (pin 5[15/5] is switched low) and V_6 decreased to V_{6A} - IC is switched off. When V_6 increases by half wave charge (see moment t_4) a new cycle can be started at moment t_1.

Start-up phase/ short circuit operation of SPH4690

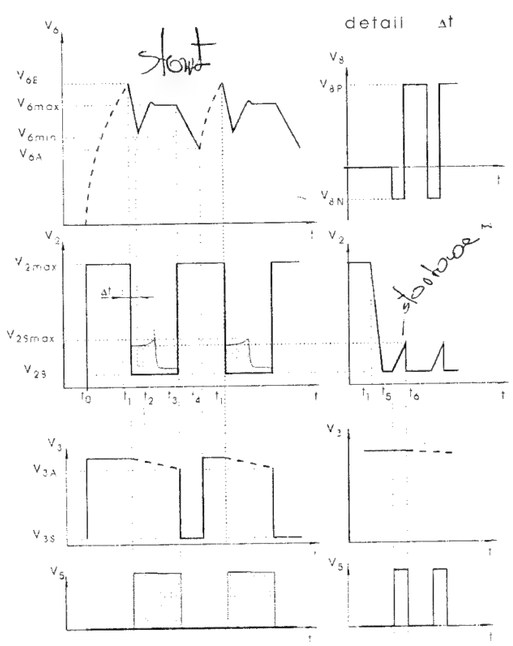


Fig. 2

Regulation-range, Overload and No-load :

After start up the IC is within the regulation range. Voltage at pin 1[1] is typically 400 mV. In case of an increasing load on the secondary side the switch on time will also be increased. The peak voltage value at pin 2[2] also rises to V_{2Smax}. If the secondary load tries to increase again the overload amplifier would start to reduce the pulse width of V5. This point is called "point of reversal". The IC supply voltage V_6 is related to the secondary voltage value. V_6 therefore decreases with increasing load due to the reduced pulse width of V_5.
At the condition V_6 << V_{6min} TDA4605[Y7007]/[Y7005] changes to burst mode (polling operation mode). Short circuit power is small, because the time delay of the half wave start up is high (from the mains frequency). In this case the overload amplifier reduces the pulse width to a certain value (tpk-mark). This minimum pulse width must be guaranteed because it is active in each start-up phase (V_1=0 V).
With decreasing load on the secondary side the pulse width of the switch on pulse (V_5=high) will also be decreased. Switching frequency will be increased to the system frequency of the circuit. If the output voltage is increased up to V_6=V_{6max}, the logic will be blocked and the TDA4605[Y7007]/[7005] will be in burst mode. SMPS works in open circuit operation.

Overtemperature :

TDA4605[Y7007]/[7005] includes an overtemperature circuit which blocks the logic if the chip temperature becomes too high. Start up is possible after reduction of the overtemperature.

AUDIO LINEAR - AL

Signal input for Record or EE Mode (AMLR) is pin 11 of LA7282 where it enters the ALC (Automatic level control) stage. The signal goes via the Rec/Pb switch, an amplifier and mute stages to pin 13. This is the output pin to the I/O section (AMLP).
The attenuator chain on pin 13 sets the necessary levels for the ALC detector with its time constant on pin 10 and for the recording amplifier with the pre-emphasis components L 5601, R3616 and C 2613.
The recording amplifier output is pin 17. The recording current is mixed with the bias current and passed via the head to pin 2 when the switch is closed.
In Pb mode the switch on pin 1 is closed. The PB signal is amplified in the equalizing stage (Time constant between pin 6 and pin 8) and adjusted with R 3606 to avoid influences of head sensitivity. Components 2600 and 3601 determine the head resonance during PB.
In the LP mode the frequency characteristic is adapted by RC networks on pins 4, 5 and 15. The oscillator circuit oscillates at about 70 kHz is used for the erase heads and the bias current. To avoid clicks, the oscillator has to be switched on slowly (Switching stage T 7604, Time constant C 2617, R 3623, Current limiter R 3625). The record voltage for the headamplifier is generated without delay with the switch T7607.
An extra mute transistor on pin 24 switches off the output pin 13 in case of record ("Amtsblatt" requirement).

FRONT END - FV (N1)
(VST-TUNING)

The receiving part consists of the following blocks

1.) Tuner
2.) IF amplifier and demodulator IC TDA 9800
3.) Band select and Tuning voltage generator
4.) 12 V Supply

1. Tuner :

The tuner family UV917/ U943 is used in the VST (Voltage synthesized tuning) version that means without internal PLL circuit. The frequency range 43-158 MHz, 140-360 Mhz and 450-856 MHz can be selected on pin 7, pin 8, and pin 10. Tuning voltage input is pin 11, AGC input is pin 5.

2. IF amplifier and demodulator IC TDA 9800 :

The IF out from the tuner pin 17 passes the SAW filter which type and frequency response depends on the TV system. The TDA 9800 is a PLL Type demodulator. The built in VCO operating at two times the picture carrier is adjusted by the coil 5703 and tuned internally by a varicap diode. The loop filter is connected to pin 6. The VCO control voltage is used for generating the AFC Voltage on pin 15.
The demodulated video signal passes internally a 12 MHz lowpass and comes to pin 13 with 1 V_{pp}. This level is controlled by an AGC circuit with internal reference level. The sound carrier is then suppressed in the trap 1722 and video is then available at pin 7 with 2 V_{pp}.
The Sound IF is filtered in the bandpass 1723 and / or 1724, and goes to the input of the adjustment free FM PLL sound demodulator. The audio signal output is at pin 9 with about 350 mV_{RMS} with a deviation of +/ 27mV_{RMS}.
The operating point of the Tuner AGC can be adjusted with Resistor 3724 to obtain a good signal to noise behaviour together with optimum large signal behaviour.
Additionally the AGC voltage is fed to an analog input of the TVC microcontroller who sends an information about the signal strength to the microprocessor on the front panel. This is done for determining the order of storing the programs in autostore mode.

3. Band select and Tuning voltage generator :

The tuning voltage and band select are controlled by the microprocessor on the MDC, NDC panel. The interface circuit uses a levelconverter to transform the 5 V logic to accurate 12 V levels and a shift register for seriell to parallel data conversion. Following control lines are used: SCL, SDA, and STROBE controls the Shift register and the PWM is a pulse width modulated signal with 4 kHz and 8 bit resolution. 6 bits of the shift register output are used for an D/A converter with a R/2R network (pos 1701). 2 bits are used for the band select logic to switch the tuner between band I III and U.

Remark: The tuner U 943 operates only in the UHF band so it does not need any bandselect logic.

To obtain the necessary resolution of the tuning steps of 60 kHz, 14 bits resolution of the D/A converter is made by adding the 6 bit of the R/2R network (LSB's) with the filtered 8 bit PWM signal (MSB`s). The filtering is done by an active filter with about 15 dB suppression of the fundamental and amplified by about 3.5 to get the full tuning voltage range up to 28 V.

4. 12 V Supply :

The 12 V regulator is stabilized by a TL 431 regulator and is short circuit protected due to its fold back characteristic. Start up capacitor is C2750. The high stability and accuracy is needed for the performance of the tuning voltage. Furthermore this regulator supplies also the linear audio circuit and the record stage of the head amplifier.

FRONT END - FV (N2/3/4/5)
(PLL-TUNING)

The front end is designed to receive :

N2 :	PAL BG	= /01
	PAL I	= /05
N3/4/5 :	PAL BG	= /01
	PAL I	= /05
	SECAM LL	= /19
	SECAM LL/PAL BG	= /39

The receiving section consists of the following areas :

1. Tuner :

In N2 the tuner UV916E for /01, and the U943 for /05 both with internal PLL circuit are used.
In N3/4/5 the tuner UV 916E for /01,/19 and /39 and the U 944C for /05 both with internal PLL circuit are used.
In case of SECAM L' the intermediate frequency of the vision carrier is 33.9 MHz, that is why the AFC circuit has to be switched from 77.8 MHz to 67.8 MHz.
The surface wave filters for /19 and /39 have 2 Nyquist slopes.
So both signals with 33.9 MHz and 38.9 MHz-SC are correctly offered to the demodulator-IC (TDA9802).

2. IF amplifier and demodulator IC :

The IF out from the tuner pin 17 passes via the SAW filter to the 3-stage IF amplifier.
The TDA 9800-9803 is a PLL - type demodulator. The built in VCO operating at the double vision carrier frequency is adjusted by the coils (AFC-Adj.) which are internally tuned by a varicap diode. The loop filter is connected to pin 6. The VCO control voltage is used for generating the AFC Voltage on pin 15.
The demodulated video signal is passed via a 12 MHz low pass filter to pin 13 with a level of 1 V_{pp}. This level is controlled by an AGC circuit with an internal reference level. The sound carrier is then suppressed in the trap and video is available at pin 7 with a level of 2 V_{pp} and after a voltage divider and emitter follower as VFV at 1V_{pp}.
The Sound IF is filtered in the bandpass Pin 13 and is passed to the input of the adjustment free FM PLL sound demodulator Pin 11. The audio signal output at pin 9 is approximately 350 mV_{RMS} with a deviation of +/-27 mV_{RMS}.
The operating point of the Tuner AGC can be adjusted with AGC-Adj. to obtain a good signal to noise behaviour together with optimum large signal behaviour.
The AGC voltage Pin 13 is also fed to an analogue input of the TVC micro controller which sends signal strength information to the microprocessor on the front panel. This is done to determine the order of program storing in the autostore mode.

3. AM demodulator IC TDA 9830 :

(only N3/4/5)

In case of SECAM L the amplitude modulated sound carrier (32.4 MHz) arrives at pin 2 of the SAW filter L9453 and after selection is passed to the AM demodulator TDA 9830.
In case of SECAM L' because of exchanged PC and SC the sound carrier is at 40.4 MHz.
The control signal SECAM BAND 1 (SB1) is diode switched to pin 1 of L9453 the 40.4 MHz BPF.
The demodulated signal is passed to the integrated switch which in multi-standard versions selects between FM sound and AM sound.
The selected signal is available on pin 8 (AFV).

4. Stabilization for the 12 V supply :

4.1 12 V supply (N2) :

The 12 V regulator is stabilized by a TL 431 regulator and is short circuit protected due to its fold back characteristic. Start up capacitor is C2750. The high stability and accuracy is needed for the performance of the tuning voltage.
This regulator also supplies the linear audio circuit and the record stage of the head amplifier.

4.2 12 V supply (N3/5) :

The output voltage is specified with 12 V +1.0/0.6V for a maximum load current of 400 mA. To ensure an uniform current division between the two series pass transistors BC636 (T7793, T7790) connected in parallel, a 6.8 Ω resistor is connected in series with each emitter. This reduces the effect of tolerances and temperature drift on the base emitter voltages. The circuit is short circuit protected, after a short circuit of the output voltage, reset has to be carried out by temporarily removing the mains plug. In this case, the electrolytic capacitor 2790 charges to start the circuit.

VIDEO SIGNAL PROCESSING -VS, -VSIO

N1/2 :	MF.. - VSIO
	NF.. - VSIO
N3/5 :	NF.. - VS
	MF.. - VS
N4 :	NF.. - VS

1. General :

Boards with extension /39 are for PAL/SECAM L.
Heart of the circuit is the IC LA7191 containing all luminance PAL chroma and SECAM BG chroma circuits in 42 pin shrinked dil case.
For the SECAM L processing the well known TDA4725 is used.
The SECAM BG detector is the LA 7311 discriminator. CCD 1H delay line is the MSM 7403RS with 5 V only supply.

2. In/Out (N1/2) :

The I/O circuit makes the selection between two signal sources, the scart input and the frontend. Audio and video signals are switched in the IC 7551. It is controlled by ESPBH and disabled via pin 6 in Play back mode. Scart 1video input is pin 20. The signal passes then the switching diode pos 6509 to pin 3 IC 7551. Scart 1 audio inputs are the pins 2 and 6. Left and right channel are added and fed to pin 2 IC 7551. Zener diodes on all inputs are used for ESD protection purpose. Capacitors are for Amtsblatt requirements. Frontend video comes from pin 7 IC 7702 via an attenuator and an emitterfollower to pin 5 IC 7551. Both the emitterfollower and the diode 6509 are biased by resistor 3513 if they should be on.
Frontend audio output signal from pin 7 IC 7702 (about 350 mV_{rms}) goes via a deemphasis network 3505/2500 to pin 2 IC 7551.

Video output emitterfollower is 7502 which drives pin 19 scart 1 and if necessary the RF Equalizer. The modulator may be switched on by the TVC microprocessor and T7500.

3. Record signal path (N1/2/3/4/5) :

3.1 Luminance:

Pin 37 is the input of the video signal with about 1V_{pp} . It is then controlled by an AGC amplifier (adjustment via pin 39, time constants pin 38 and pin 16), passes a 6 dB attenuator, a 3.5 MHz low pass filter, a clamp, some switches in the noise canceller/dropout compensator part and is output via an amplifier on pin 3. The signal then goes to an emitter follower, a low pass filter and a second emitter follower to pin 4. You have to adjust the E/E Level pot to obtain 0.5V_{pp} on this pin with a 100% white picture. This is necessary for the right values on pin 34 video out and the values of the white and dark clip levels.
Following the signal on pin 4 now without chrominance components it passes a clamp, a detail enhancer (time constant pin 8), a nonlinear emphasis (time constant pin 7, on/off is controlled by the DC level on pin 7) and the main emphasis with internal white and dark clip (time constants between pin 5 and 6).
The signal then goes via the deviation potmeter to pin 42 of the input of the FM modulator. The FM is then filtered, adjusted by the FM record current pot and goes to the summing stage and the head amplifier.
The loop through path outputs the signal via a feedback clamp and an insert stage (control pin 33) to pin 34 and via an emitter follower to the I/O part of the VCR.

3.2 Chrominance PAL :

After the in 3.1 mentioned 6 dB attenuator the signal also comes to the 4.43 Mhz bandpass filter, an ACC (Automatic Chroma Control time constant pin 14), the main converter, a 1 Mhz low pass filter, a killer stage to pin 15 and via the chroma record current to the summing stage.
The 5.06 MHz for the main converter comes via the 5.06 MHz bandpass filter from the sub converter where 4.43 MHz from the VXO and 627 kHz from the Line PLL is mixed. The Line PLL is locked to the composite sync pulse from the sync separator. It uses a 321 x fH VCO (Loop filter on pin 23 and 24). The frequency is then divided by 8 in 4 different 90 degree shifted phases as it is necessary for the VHS standard. Phase shift control input is pin 41 which is also an SP/LP-input. The Line PLL part also produces the Burst Gate Pulse BGP. The VXO is locked to the incoming burst signal via the record APC detector (Loop filter pin 17).
This IC uses a special crystal for which no adjustment is necessary. An additional frequency doubler with the output on pin 21 supplies the 8.86 MHz for the CCD. The H/2 frequency is taken from pin 17 (only for N3/5). It is the information about the phase of chroma for making color inserts on teletext boards possible in the correct phase (option).

3.3.1 Chrominance SECAM BG :

Pin 27 H forces the IC to SECAM BG mode.

- Phase rotation off
- VXO fixed frequency
- filter charcteristicof bandpass more wide
- The SECAM BG detector LA 7311 generates this switching voltage (only for N1/2).

3.3.2 Chrominance SECAM L (N3/4/5) :

(see circuit description CSP)

4. Playback signal path :

4.1 Luminance:

The FM playback voltage goes via the necessary filters to pin 39 of IC 7051.
The FM then goes to a double limiter stage, a FM - demodulator and a sub low pass filter. Pin 3 has a high impedance in play so the connected R/C components act as a linear deemphasis. Pin 2 allows a correction of frequency response and the adjustment of

the Y PB Level. Measuring point for this level is the output pin 34 while you play back a standard 100% white recording.
After correction of the frequency response in the external low pass filter now switched by the LM339 to a slightly different characteristic, the video passes, via pin 4, the 3.5 MHz low pass, the noise canceller and dropout compensator part. For both functions the 1 H CCD is necessary. Pin 12 supplies the video to the CCD and pin 10 receives the signal where a Voltage Controlled Amplifier VCA adjusts automatically the gain tolerances of the CCD. For this function the capacitor of pin 9 is important.
You can check CCD function by connecting pin 2 to 5V in E/E mode and then measure on pin 32 the difference signal of 2 lines. After the noise canceller the video passes the nonlinear deemphasis (time constant pin 7 as rec), a noise canceller (time constant pin 8), the picture control stage (controlled by DC on pin 13 2V = soft, 3V = sharp), the Y/Chroma mixing stage and the video output amp to pin 34.

4.2 Chrominance PAL :

627 kHz Chroma from tape goes through a 1 MHz low pass filter and an amplifier with group delay correction to pin 15 of the IC. The chroma is amplified, controlled in the ACC amplifier, mixed with 5.06 MHz and goes via the 4.43 MHz bandpass and an amplifier to the combfilter where crosstalk components from the neighbor tracks are removed. The chroma then comes back to the IC at pin 27 where it is amplified.

4.3.1 Chrominance SECAM BG :

Signal path is about the same as in PAL.
Differences:
- 321 fH VCO locked to sync
- no phase rotation
- Comb filter off
- internal bandpass filter more bandwith
- no colorkiller function color always on

4.3.2 Chrominance SECAM L (N3/4/5) :

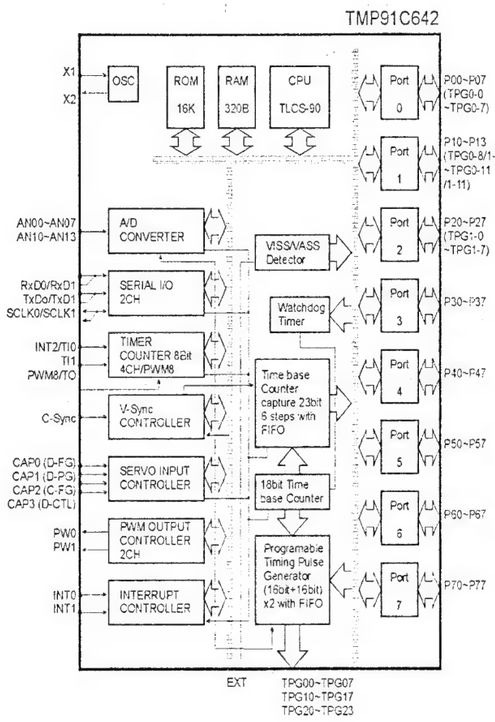
(see circuit description CSP)

DECKELECTRONIC - DE

1. General :

TVC (TMP91C642N-Maske; TMP91P642N-OTP)
The TVC (Toshiba Video Controller) is a one chip microcontroller.

- 16k byte ROM
- 320 byte RAM
- 8-bit A/D converter
- 2 serielle Businterface
- 2 12-bit PWM outputs
- 1 8-bit PWM output
- Composite sync input
- spezielle Servo inputs



8 analogue inputs are available. The input signals are fed to the A/DC via a multiplexer. The resolution of the converter is 8 bit. The maximum permissable input voltage range is 0...5V (defined by the reference voltages AVSS and AVCC).
Four analogue outputs are available each with a 8 bit resolution. These outputs supply a signal of constant frequency. (appr. 21,5 kHz) with variable pulse/interval ratio. It is possible to obtain a resolution of 14 bit by software. To achieve this resolution, two PWM outputs are internally linked. This means loss of one PWM output pin. The second output pin can then only be used as an ordinary circuit output. The possibility of the increased resolution is used by the headwheel drive (REEL line).

2. SAA 1310 Deck mechanics interface :

2.1 CTL-stage :

The IC SAA 1310 contains a write/read stage for the CTL track, with the possibility of interference-free overwriting of an existing CTL track (e.g. if another index code (VISS or VASS) is to be written on the tape). The playback stage is equipped with a "digital", two-stage AGC. By comparators, this circuit logic identifies the size of the output signal supplied by the CTL head and then selects the best amplifier gain in the playback stage. Note: The playback signal from the head follows the law of induction (dΦ>/dt) and is therefore

largely - with the exception of the gap function - proportional to the tape speed. The CTL head voltage can therefore vary considerably from vmax when FAST SEARCH (index search) is used to vmin when the LP mode which has the slowest tape speed. The highest speed sets in with FAST WIND or FAST SEARCH (Index search). To ensure that under the above mentioned conditions the pulse/interval ratio of the tape sync is always correctly reproduced (it is important for the distinction of 1 and 0 for VISS or VASS marks), the amplifier must not be overdriven. The two-stage AGC alone cannot process the large dynamic range of the input voltage. The amplifier is therefore provided with an internal low pass feature (fg = 3 kHz typ.) and also the amplification is further reduced for all winding modes by means of transitor 7403. In this case, the signal WIND = low and T7403 is disabled. The transistor is deliberately polarity inverted, as the inverse operation has the better damping qualities for this application. If T7403 is disabled, the amplifier's feedback network, as well as the external resistor 3454 is also disabled. Alternative short-circuit of R3454 with T7403 permits to reduce the amplification in the proportion

g on / g off = 1 + R3454 / 100

In parallel to the CTL head, there is the R.C. circuit of C2411 (4n7) and R3453 (4k7). Together with the CTL head inductance, the capacitor causes a resonance step-up at approx. 8 kHz. The R3453 causes a steep fall of the frequency transmission characteristic beyond resonance, providing an effective suppression of high-frequency stray pickup. The CTL head signal amplitude in SP is approx. 1...2 mVpp. Therefore the gain of the playback amplifier has to be suitably high. To avoid offset problems, a 47 µF electroytic capacitor (C2410) is built into the negative feedback branch for DC decoupling. Together with the internal 100 Ω feedback resistor, this electrolytic capacitor causes a high-pass behaviour. It must be of sufficient capacity to ensure that the differentiating effect is beyond a cut-off frequency, where the distortions of the signal shapes at the lowest tape speed rates remain negligible. Otherwise overshoots occur after each change of magnetisation on the tape, resulting in faulty triggering of the internal logic and therefore in faulty sync signals. The polarity of the playback amplifier can be reversed with the Capstan-Reverse (CREV) voltage. This enables the TVC always to see the correct sync edge independent of the tape feed direction. The W/R (Write/Read) signal is used to change between record and playback.

W = high and R = low.

The SYNC line (pin 16) is a bidirectional line. In the case of write, a square-wave signal of 40 ms period is output by the TVC . The recording amplifier in the SAA 1310 converts this voltage into a square-wave recording current of approx. +/-2mA. Pin 3 of the SAA 1310 is the buffered output of the IC internal reference (2,5V +/- 0,1V).

2.2 POR (Power On Reset) - Generator :

The POR generator contained in the SAA 1310 requires only one external component. This is the capacitor 2414 which defines the length of the POR pulse. At 33 nF, t por is approx. 30 ms.

2.3 The sensor interface :

The four comparators in the SAA 1310 are used to convert sensor signals to logic levels. Two of these comparators have open collector outputs (pin 11 and 13), which can source a current of 100 mA. The outputs are overload protected by a current limiter and thermal shutdown.
Only the non-inverting input of each comparator is accessible from the outside. The other inputs are connected to the internal reference voltage of nom. 2,5 V. Also the hysteresis of the comparators of approx. 10 mV is set internally.

The following sensors are evalutated:

Comporator 1 (In Pin 5 Out Pin 15) :
FTA threading tachometer. This signal comes from a forked light barrier in the deck. An infra-red light beam is interrupted by a four-blade impeller (butterfly). The output amplitude of the sensor has to have a minimum variation of between 2V and 3V to ensure correct evaluation. By means of R3451 and R3449, an additional hysteresis is obtained.

Comporator 2,3 (In Pin 6,7 Out Pin 14,13) :
WTR/WTL (Winding tachometer right/left) comes from reflected light beams. The minimum output requirement is the same as the FTA.

Comporator 4 (In Pin 8 Out Pin 11) :
FG = Capstan tachometer. This signal comes from the sensor print on the turbo drive via the pre-amplifier of the tacho-HALL sensor in the motor unit. The amplitude of the almost sine-shaped signal is typ. 1 Vpp. The minimum acceptable level is 300mVpp. The signal is AC-coupled via C2415. Therefore the input at pin 8 is connected to the reference voltage at pin 3 via the resistor 3452. The capacitor C2413 in parallel with 3452 is to remove HF noise.

3. Interface to the headwheel motor driver :

The connection to the HMO driver IC on the LHA print is via plug 1915. The speed regulating signal is

REEL he resolution is 14 bit. PG/FG is the combined POS/tachometer signal of TDA5140 (HMO driver).

TRIV (Tracking Information Video) is the envelope information from the head amplifier.

It goes into one of the analogue inputs of the TVC . The current drawn from the +14M2 under ambient temperature conditions is typ. 70mA. During the run-up period of the motor approx. 0.5 A flow for a short time.

4. Interface to the Capstan motor :

4.1 Motor driver interface :

The Capstan motor in the turbo drive is driven via plug 1913. CAP is the Capstan speed signal, which can vary without load between 0 and 5 V. By means of CREV (Capstan reverse) the direction of the motor rotation is changed. The signal is fed via a diode to the motor driver, thus effectively preventing latch-up (otherwise the current limiting will fail). The maximum current consumption of the motor is limited to 1 A. Typical values in PLAY mode are 0,2 ...0,3 A.

4.2 Voltage switch for capstan motor :

Due to the wide speed operating range of the deck mechanics a large power operating range is required of the CMO driver, in the DD-capstan motor module in the deck. To avoid high power dissipation in the circuit, 2 different voltages are provided by the power supply for the CMO, a 14,5V (typ) for the Modes where faster tape movement is required and a +8M2 for PLAY. The switch selection of the voltage is controlled by the WIND sigani and the switching transistor T7406.

4.3 Tachometer preamplifier :

The Tachometer preamplifier is located on the sensor print. It is a DC coupled differential amplifier using discrete components. AC and DC amplification are different to avoid problems with the offset of the Hall element.

5. Threading motor driver :

The TMO driver is provided in bridge circuit using a dual power opamp. L2722. This IC can supply an output current of +/-1A. It has diode protection (fly-back diodes) at the outputs.
Between the IC outputs (Pin 1 and 3) there is a Boucherot element (1 Ω, 100 nF) to suppress a 3 MHz spurious oscillation from the power amplifier. One half of the bridge is controlled via the TMO line and functions as comparator. The other half is an amplifier-integrator with gain 3.9 times. A variation of the input voltage (THIO) between 0 and 5V causes a voltage variation at the output between 0V and nearly supply voltage. In case of a 50% modulation (THIO = 2,5V), there is approx. 7V at PIN3. The integration with C2102 serves to filter out the PWM frequency of approx. 21,5 Hz. The polarity of the comparator (noninvert.) and of the opamp (invert.) is selected as follows: In the event of a Power-On Reset, the TVC takes the THIO line "L", whereas TMO is "H". The above polarity must be observed to ensure that no current is applied to the motor during the POR pulse period. To avoid the

adverse conditions that would be applied to the motor in the event of the loss of the 5V supply a separate reference divider is provided for the comparator section. Both outputs of the L2722 are now "common-mode" in the event of the above mentioned failure.

6. Tape end - LED - control :

The LED current is controlled by transistor 7404. The ON time is approx. 1 ms. with an ON/OFF ratio of 0.09. C2404 slightly attenuates the slopes to avoid interference in the signal electronics. The LED current is at least 75 mA and supplied by the +14M1.

7. Analogue interface to the TVC :

The following analogue levels are supplied to the TVC internal A/D-C :

TRIV	Tracking information Video
TAE/TAS	Tape end/Tape Start Detection
I/R	combined information from INIT and Record protection
AGC	Automatic Gain Control

8. Test picture generation for non TXT equipment

By means of the resistor network R3426, R3425, R3424, R3422 and the corresponding selection of lines IOFP and FFP by the TVC, the levels (Sync, black, white) for a test picture can be generated and inserted in the signal path by the signal processing IC (7051)

9. Sensing of the tape deck switch :

The contains two switches :

INIT	initialisation switch
RECP	record protection

The states of these two switches is input with a single line (I/R) into an analogue input of the TVC (pin 57). Each switch output, the level of which can be "H" (5V) or "L" (OV),is coupled via a resistor-driver network. Each possible switch combination then provides a unique voltage level on the I/R line.

10. Version definition :

Only one ROM mask is used, therefore it is necessary to define the wanted version.

Pin 1	Longplay
Pin 24	2 or 3 Kopf (head amplifier)
Pin 36	4 head yes/no (not N4
Pin 55	Pal 1 (VHF/SEC-LP (not N4)

11. 12 V supply (N4) :

The output voltage is specified with 12 V + 1.0/0.6V for a maximum load current of 400 mA. To ensure an uniform current division between the two series pass transistors BC636 (T7423, T7424) connected in parallel, a 11 Ω resistor is connected in series with each emitter. This reduces the effect of tolerances and temperature drift on the base emitter voltages. The circuit is short circuit protected, after a short circuit of the output voltage, reset has to be carried out by temporarily removing the mains plug. In this case, the electrolytic capacitor 3431 charges to start the circuit.

12. EE - Prom :

An EEPROM is an electrical not volatil ROM, on which it is possible to save and delete information. The information is not lost if the mains is disconnected. The R/W cycle takes place as usual via the serial IIC-Bus SDA, SCL. It is now possible to save specific deck parameters, for example, X-distance, gap position, tuning limits (for Amtsblatt requirments) and possible also differences between TAE and TAS; left and right tolerance of the tape end light barrier (until now coupled photo transistor were used). The preset potentiometer for the gap position is no longer necessary. The adjustment occurs automatically when using a test cassette and pressing certain keys. The preset channels and some options are also saved in the EEPROM.

13 . CMT - detection :

The CSYNC wire is connected with two TVC pins. One off this pins detects the 50 Hz (Pin 12 Port 33) and the other detects the 15,625 kHz (Pin 8 Port 47).
This is necessary to recognice video signals only and not other 50 Hz transmitter signals.

CSP - BOARD (N3/4/5)

Recording :

The CCVS signal (VBS) from the " IN/OUT" circuit stage is fed through the solder connection 0201 pin1 and the emitter follower T7240 to a stage for chroma selection (Q5102 / T7200). The selected chroma signal then passes through the trap circuit (L5203 / C2201 / L5204 / C2203 / R3206) to arrive at IC7520 pin25. The trap circuit increases the selective effect of the "gaussian filter circuit" (Q5102) . Subsequently, the signal passes through a 15 dB amplifier and is then taken via pins 23 and 22 to a limiting amplifier with a following frequency divider. Dividing the chroma signal in a ratio of 1:4 this divider generates the necessary 1.1 MHz signal for recording which is applied to pin 19 of IC7520. The bandpass which follows then reduces the harmonics resulting from the frequency division and the signal is routed to pin 17 of IC7520. Afterwards it is subjected to a 10 dB amplifier and switched to pin 13. Between pin 13 and 12 the 1.1 MHz signal is fed through an "antigaussian filter circuit" (Q5207). The signal is limited then in IC7520 and passed via pin 15 and the solder connection 0202-1101 pin6 to the Video/Chroma circuit stage (Family Board) as "CHRS"- signal. It is then fed through an adjustment control for the SECAM chroma recording current, R3098 (CHROMINANCE WRITING CURRENT SECAM) to the junction R3098 i R3100 where the signal is added to the Y-signal. The sum signal (FMRV) is taken via the amplifier stage T7029 / T7030 and plug contact 1911 pin2 to the head amplifier.

Control of the switches in IC7520 :

On recording, a LOW level (0.7V) is present at the collector of the transistor T7205. This transistor works like a diode, turns on and applies approximately 1.3V to IC7520 pin21. From this level. the following detection stage can identify the recording mode and switches all in circuit switches to record position. 3.2

Playback :

On playback, the "uncontrolled FM signals from the tape" (FMPV) is taken to pin 21 of the IC7520 and is then amplified by 6 dB. From pin 19, the signal is fed via a bandpass to IC7520 pin17. Between pins 17 and 16, the obtained 1.1 MHz signal passes through a 10 dB amplifier; via pin 14, it is fed to another amplifier in IC7520 whose feedback stage contains an "anti-gaussian filter circuit (Q5207)" which is connected between pin 12 and pin 14. In the AGC stage following the amplifier the signal undergoes an automatic gain control (AGC) and its frequency is doubled (2.2MHz) in the fullwave rectifier RECT. From IC7520 pin8 the 2.2 MHz signal is fed to the bandpass F5211 which removes disturbing harmonics from the wanted signal. In another doubling stage which obtains the 2.2 MHz signal from IC7520 pin6 a 4.4 MHz signal is generated. This signal is subsequently amplified by 10 dB and is fed to the colour killer via pin 27, the anti-gaussian filter circuit (Q5202) and pin 28. From IC7520 pin1 the 4.4 MHz signal is fed into the bandpass F5209 which separates disturbing harmonics from the wanted signal. The resulting SECAM chroma signal (CIN) is taken via the impedance converter T7203 and the solder connection 0203 pin2 / 1101 pin8 to t he Video/Chroma circuit stage (Family Board) and is then added to the CVS-signal in IC7051.

IN/OUT - I/O, MSIO (N3/5)

(INCLUDING SUBPRINT MSIO)

The I/O circuit selects the different signal sources. Audio and video signals are switched by ICs (HEF 4053). Switching is controlled by the ESPBH line and on MSIO by ES2. Scart 1 video input signal VIN1 from pin 20 is passed by the switching diode (pos 6565, 6566) to pins 5 and 2 of IC7590 on MSIO.
From pin 5 it goes via pin 4 and T7560 to Video out on Scart 2. From pin 2 via pin 15, video VE12 returns to IC 7592 at pin 1 and via pin 15 is passed to the signal electronics section as VBS. Scart 1 audio inputs from pins 2 and 6 (left and right channel) are added to AIN1 and fed to pins 5 and 2 IC7591 on MSIO.From pin 5 it goes via pin 4 and T7580 to Audio out on Scart 2. From pin 2 via pin 15 audio AE12 returns to pin 13 of IC 7592 and is output at pin 14 as AMLR the audio part.
The Front end video VFV comes from pin 7 IC7720 via an attenuator and an emitter follower on the front end to pin 3 IC7590 on MSIO and then goes to Video out on Scart 2 via pin 3 and T7560. VFV returns as VTX to pins 2 and 5 IC7592. From pin 2 it is passed via pin 15 as VBS to the signal electronics section.
From pin 5 it is switched via pin 4 to a pull up resistor. The Front end audio output signal AFV from pin 8 IC 7840 on the front end goes to pin 12 IC7592 and via MSIO to pin 3 IC7591. From pin 12 IC7592 it goes via pin 14 to the audio section as AMLR. On MSIO pin 3 IC7591 can be connected through via pin 4 and an emitter follower to Audio out on Scart 2. Scart 2 video input signal on MSIO is passed via switching diodes to pin 1 and pin 13 IC 7590. From pin 1 via pin 15 VE12 goes the same way as described previously.
From pin 13 it can be connected through via pin 14 as VOUT1 to pin 19 of Scart 1. Scart 2 audio inputs from pin 2 and 6 (left and right channel) are added to AIN2 and fed to pins 13 and 1 of IC7591 on MSIO. From pin 13 it arrives via pin 14 and T7540 as AOUT1, Audio out on Scart 1. From pin 1 via pin 15 audio AE12 goes the same way as described previously. Video signal VSB from signal electronics goes via MSIO as VIDOUT out to the modulator section. Also VSB at MSIO is passed via an attenuator, the emitter-follower 7509 to pin 12 IC7590. From pin 12 it can be connected via pin 14 as VOUT1 to Scart 1. VPS-Option : In this case VSB is also fed to IC7600 SDA 5642 where data from line 16 is detected and sent via IIC bus to the controller. Audio signal ALMP from the audio section is passed directly to the modulator. It is also passed to pin 12 IC7591 on MSIO and leaves via pin 14 as AOUT1 to Scart 1. There is also RGB loop through between Scart 1 and Scart 2. The linking of pin 16 (blanking) between Scart 1 and Scart 2 can be switched by T7550 using control signal SCRTV. Pin 8 (switching) of Scart 1 is controlled by 8SC1. Pin 8 (switching) of Scart 2 is controlled by 8SC2. Zener diodes are used at all inputs for ESD protection, the capacitors are "Amtsblatt" requirements.

I/O, TXT - BOARD MVIO (N3/5)

1. Controller (pos. 7000) :

The controller consits of a 8032 micro processor with external 128K x 8 OPTROM and 8K x 8 RAM. The address lines to Port 0 are latched as this port supports both address and data lines. As the 8032 only supports 16 pins for address control, the highest address A16 must be generated with a "normal" Portpin. An RC circuit is used to provide a timing safeguard between the use of A16 pin as an address and as a data pin.
The control processor is linked via the I^2C-Bus with the display µP and trough the UART-bus, in the shift register mode, with the deck-µP. For operational speed the control processor triggers the display processor via the interrupt line (INT).
Operating in a high speed mode the controller runs all other I^2C-Bus functions including the teletext decoder (SAA5246AGP/E).
All non volatile data as for example programme data, source codes, preferred pages. etc. are saved in a 1K x 8 EEPROM on the familyboard.

2. Integrated Video-Processor and Teletext decoder (pos. 7200) :

Within the processor, 27 MHz oscillation from the colpitts oscillator, is divided down to provide the teletext data clock of 6.93 MHz the display timing and the line frequency 15625 Hz.
The data slicer separates the teletext information from the vertical blanking interval of the video signal. The teletext data is saved in the RAM and if required converted to RGB signals in the display generator. The amplitude of the RGB signals is fixed by an external voltage divider. These RGB signals are encoded to a CVBS signal.
Using the line pulse the teletext controller generates artificial Syncs for the TV (STTV). This STTV is not interlaced during full page-mode (312/312 lines). In subtitles-mode, due to association with the background picture, it is interlaced (312,5/312,5).
The BLANK output indicates at what time a teletext information is available. BLANK gives the opportunity to fade subtitles.
In order to increase the access speed of new page selection the teletext controller saves in the RAM a total of 4 or 8 pages depending on the method of execution.

3. Colour encoder (pos. 7300) :

TV sets which are equiped with teletext, drive the colour picture tube from TXT-RGB signals. As VCRs do not normally provide an RGB output, and some TV sets are not provided with RGB input, a CVBS signal must be generated.
The colour encoder (MC1377) encodes this CVBS from the RGB signals, a Compqsit Sync. (STTV) and a 4.43 MHz oscillation (FSC). This colour subcarrier is brought into correct phase by shift circuit.
The H/2 correction results from the selective amplification of a sample of the subcarrier-PLL in the signal electronics. The coil is not adjusted to the maximum amplification but for correct phase. With this generated H/2 sinewave, the encoder is synchronised via a transistor.

4. Video insertion and switching (pos. 7400) :

For video insertion, the video switch BA7605N is used to clamp all the input signals to 2.0V and all the output signals to 0.6 V Sync tip.
The frontend video VFV and the teletext information are offered with 1 V_{pp} to one of the 2 switches (on pin 8 and pin 10). The modified BLANK pulse inserts subtitles when available. This VTX signal is then fed to the signal electronics for recording or monitor.
In case of Full page-mode the switch is blocked by FP line. For subtitles during MESECAM-standard transmissions the FP-PAL line activates a chroma bypass and turns the FSC off.
The output of the signal electronics VSB (on pin 1) and the teletext information ($2V_{pp}$ on pin 3) are connected to the second switch. This switch is directly controlled by the Full-page line (FP).

5. I/O section :

The I/O section is composed of 2 triple HEF switches; pos. 7590 for the video signals and pos. 7591 for the audio signals.
The control of these switches is by the 2 lines ES-2 (external source) and SCRTV (scrambled TV).
In order to reduce the control lines, ES-2 and SCRTV each carry out two functions.

If an ext. source is chosen (E1 or E2), ES 2 selects either SCART-1 IN or SCART-2 IN, it also selects either the front end signal or the SCART-1 input signal to pass to the SCART-2 output.
SCRTV has the function in the decoder mode to connect the SCART-2 input to the SCART-1 output, and also permits the passive RGB-loop of through the blanking signal between SCART-2 and SCART-1.

6. VPS :

If the teletext decoder SAA5246 is exchanged with its substitute SAA5248, VPS will also ba available. The SDA5642 is provided as backup solution.

NFM PANEL (N4)

1. Playback :

Lines SOFT1, SOFT2 and TAPE control the focus of the video picture during playback by influencing the FM processing frequency response.
TAPE is active (high) with tapes with a high playback amplitude (high TRIV signal) and increases the resolution by activating T7205 and T7206.
This occurs in such instances as with SVHS tapes on which VHS signals have been recorded.
SOFT2 is active (high) with tapes with a low playback voltage and switches the picture one step "softer" with T7203.
SOFT1 is active (high) during LP playback and also switches the picture one step "softer" with T7104.

2. Recording :

When recording, lines SOFT1, SOFT2 and TAPE control an 8-stage attenuator (T7200, T7201, T7202), which provides "automatic write current optimisation" (optional).
The FMRV write current is written and read at 8 different levels (40 ms) when the tape is threaded and stationary.
The TRIV signal is measured during reading and the write current that achieves the highest playback amplitude is established.
This process is carried out 4 times. The optimum write current setting is stored once the results have been averaged out.

NIO - BOARD (N4)

Description of function :

General :

The fact that the family board can be used universally means that the input and output selection switches have to be split between the NFB4 and the N10. The various control line outputs are made by shift register 7413.

Input selection switch :

The front sockets, the front end and SCART1 / SCART2 are selected using selection switch 7592 (NFB4). The relevant control lines are IS1 and IS2. The selection of either SCART1 or SCART2 is done at the NIO by control line ES1 with ICs 7590 and 7591. The video signal selected (VBS) is now routed to the signal electronics section and the audio signal selected (ALMR) to the lin. audio section.

SCART2 output

Control line ES2 and ICs 7590 and 7591 at the NIO are used to determine whether the front end signal or SCART1-In should be at SCART2-Out.

OSD (optional)

The OSD information is overlaid onto the output signal in the signal electronic section (VSB) at the NIO. The signal is then known as VIDOUT.

SCART1 output

The SCRTV control line and ICs 7590 and 7591 (NIO) are used to determine whether SCART2-In or the output signal from the signal electronics section should be at SCART1-Out. The output signal from the signal electronics section can either be the playback signal or, if the signal electronics section is located in the look-through, the VBS signal (see Item 2).

MOD-out

The modulator signal is the output signal from the signal electronics section including the OSD information (VIDOUT).

16:9 (optional)

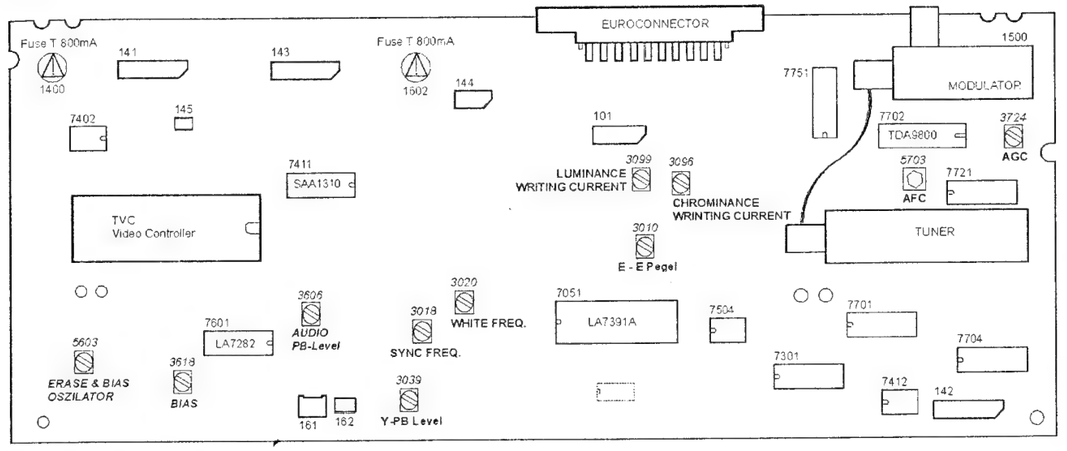
Control line 8SC1 switches pin 8 on SCART1 via transistors 7502 and 7501. Control line SC1HL along with transistor 7503 and Z diode 6505 determines whether the power output should be 6V or 12V.

Follow me (optional)

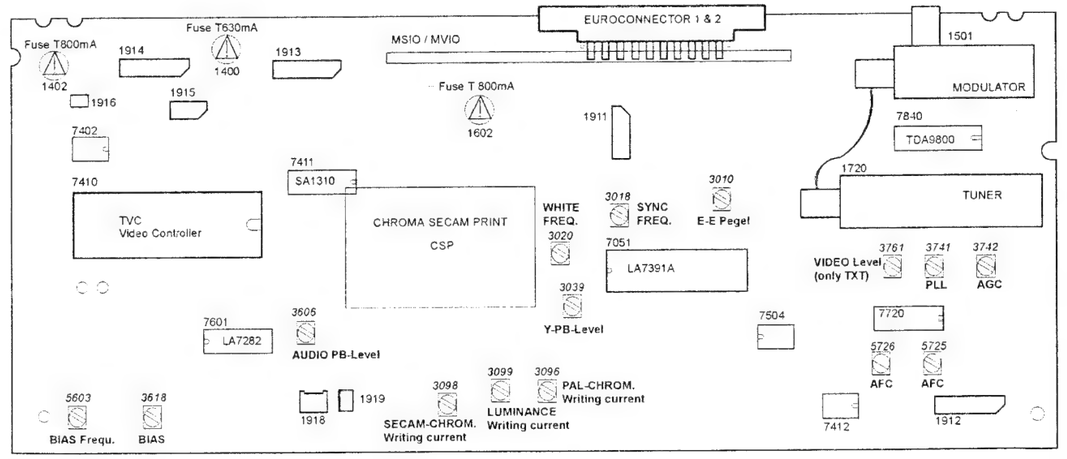
The video signal from the internal front end of the VCR (VFV) and the video signal from the television set connected to SCART1-in (VIN1) are digitised via comparators and then compared with one another. Low at the circuit output means that the picture contents from the two video signals are identical and that they must come from the same transmitter.

ADJUSTMENTS

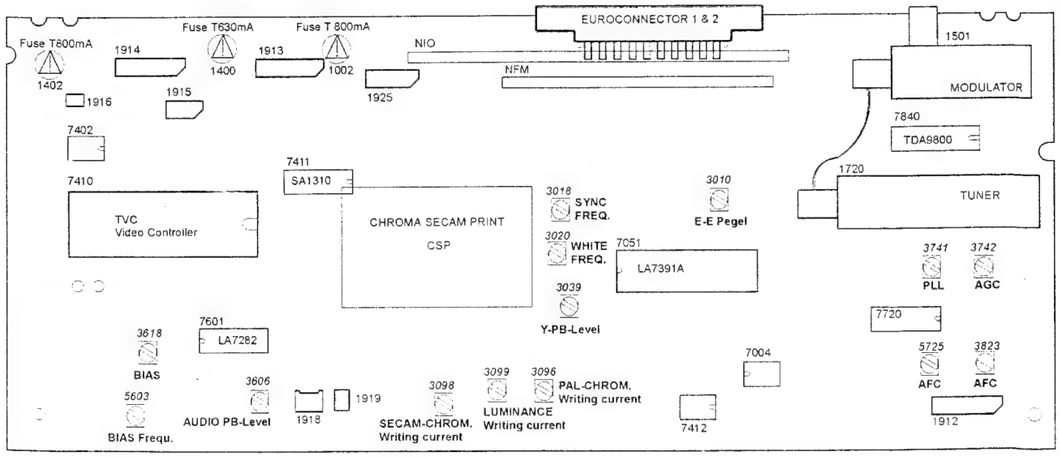
Family Board N1/2



Family Board N3/5:



Family Board 4:



VIDEOSIGNALPROCESSING :

1. E-E level (3010) :

- Connect a pattern generator and apply a 100% white
- picture to the Euroconnector (programme E1).
- Select 'Stop' mode.
- Connect an oscillocope to Pin 4 of IC7051.
- Adjust resistor 3010 until the amplitude of the output voltage is 0.52 V_{pp} ± 0.02 V_{pp} (Fig.1).
- Check that the voltage at the connector Scart1 pin 19 1,9 V_{pp} ± 0.1 V_{pp}.

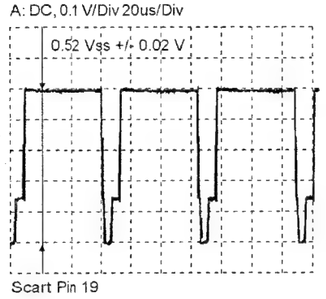


Fig. 1

2. Sync frequency (3018) :

- Select 'record' mode.
- Apply no signal (programme E1).
- Connect a frequency counter to the 'video current test pin' (MP1) on the head amplifier.
- Adjust resistor 3018 until the frequency counter indicates 3.800 MHz ± 10 kHz.

3. White frequency (3020) :

Before carrying out this adjustment, check point 1 and 2.

- Connect a pattern generator and apply a 100% white picture.
- Select 'record' mode.
- Connect an oscilloscope to the 'video current test pin' (MP1) on the head amplifier.
- Adjust resistor 3020 until the frequency counter reads 4.600 MHz ± 10 kHz.

4. Writing current adjustment :

N1/2 : Adj. R3099 and R3096 balancing jointly !
N3/4/5 : Adj. R3099 and R3096 and R3098 balancing jointly !

4.1 Luminance writing current adjustment (3099) :

- Select 'record' mode.
- Connect an oscilloscope to the 'video current test pin' (MP1) on the head amplifier.
- Apply no signal (programme E1).
- Adjust resistor 3099 for a signal amplitude of (Fig.2) :
- 260 mV_{pp} standard play sets (2/0, 3/0)
- 230 mV_{pp} longply sets (4/0, 2/0LP)

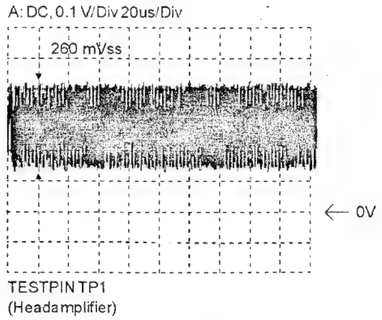


Fig. 2

4.2 PAL Chrominance writing current adjustment (3096) :

- Select 'record' mode.
- Connect an oscilloscope to the 'video current test pin' (MP1) on the head amplifier.
- Connect a pattern generator and apply a red (75%) signal (Burst:Chroma = 1:2,2) to the Euroconnector (programme E1).
- Connect pin 40 of IC7051 to + 5V.
- Adjust resistor 3096 for a signal amplitude of :
  55 mVpp standard play sets (2/0, 3/0)
  49 mVpp longply sets (4/0, 2/0LP)
  (Fig. 3) (-13.5 dB relative to the luminance signal)

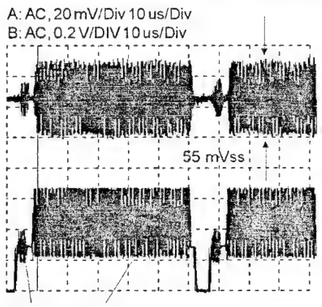


Fig. 3

4.3 SECAM Chrominance writing current adjustment (3098) (only N3/4/5) :

- Select 'record' mode.
- Connect an oscilloscope to the 'video current test pin' (MP1) on the head amplifier.
- Connect a pattern generator and apply a secam red signal to the Euroconnector (programme E1).
- Connect pin 40 of IC7051 to + 5V.
- Adjust resistor 3098 for a signal amplitude of :
  35 mV_{pp} standard play sets (2/0, 3/0)
  31 mV_{pp} longply sets (4/0, 2/0LP)
  (Fig. 4) (-17.4 dB relative to the luminance signal).

5. Luminance playback level (3039) :

- Play a 100% white picture from a cassette.
- Connect an oscilloscope to connector scart pin 19.
- Adjust resistor 3039 until the amplitude of the output signal is 2.0 V_{pp} ± 0.1 V_{pp} (Fig. 4).

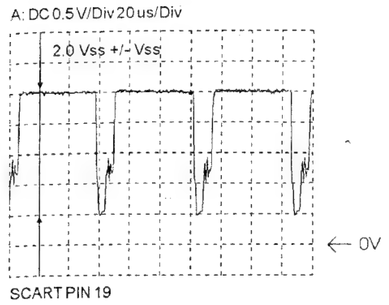


Fig. 4

FRONT END (N1/2)

1. Adjustment of the video demodulator (5703) :

- Apply on tuner pos. 1720 Pin 17 100 mV_{eff} 38,9 MHz.
- Adjust with demodulator coil 5703 on Pin 15 IC 7702 2,5 V ± 0,2 V DC.

2. Adjustment of the RF-AGC (3724) :

- Supply a PAL white picture with an amplitude of 2,2 mV_{eff} (67 $dB_{\mu V}$) with sound carrier but without ton modulation.
- Connect an oscilloskope to tuner 1701 pin 17.
- Adjust with 3724 on 550 mV_{pp} +50 mV/-0 mV.

3. Adjustment of the tuning limits :

(only for Amtsblatt requirements)

- Erase the EEPROM.
- Remove the mains supply and press WIND, REWIND and DOWN simultaneously and while the keys are held down reconnect the mains supply.
- Select SERVICE mode.Press approx. 5 sec. STOP on RC and PLAY on the recorder.
- Connect a pattern generator with colour bar and adjusted for channel E2 (48,25 MHz).
- Aktivat channel search until the recorder has found the channel.
- Press STOP on RC and REWIND on the recorder.Storing the lower tuning limit.
- Adjust pattern generator for channel E69 (855,25 MHz).
- Aktivat channel search until the recorder has found the channel.
- Press STOP on RC and WIND on the recorder.Storing the upper tuning limit.
- Adjust pattern generator for channel S22 (311.25 MHz).
- Aktivat channel search until the recorder has found the channel.
- Press STOP on RC and RECORD on the recorder.Storing the upper tuning limit Band III.
- Switch the set to STAND BY.

FRONT END (N3/4/5)

1. AFC-adjustment (5725) :

- Supply via a 22 nF capacitor a 38.9 MHz sinewave signal with 100 mV_{eff} to pin 17 of tuner 1701
- Connect a voltmeter to IC7720 pin 15.
- Balance to 2,5 V ± 0,1 V by means of coil 5725.

2. AFC-adjustment for SECAM und MULTISTANDARD sets :

N3/5 : coil 5726
N4 : resistor 3823

- Supply via a 22 nF capacitor a 33.9 MHz sinewave signal with 100 mV_{eff} to pin17 of tuner
- Connect signal PSS (plug 1912 pin 1) to ground (Secam aktive)
- Connect signal SB1 (plug 1912 pin 5) to ground (Band 1 aktive)
- Connect a voltmeter to IC7720 pin 15.
- Balance to 2,5 V ± 0,1 V by means of coil 5726 (N4 : resistor 3823).

Carry out the 5725 and 5726 balancing jointly ! (only N3/5)

3. PLL signal to noise ratio for SECAM und MULTISTANDARD sets (3741) :

- Supply a PAL picture with sound carrier but without ton modulation.
- Connect an oscilloskope to plug 1591 pin 16 (AMLP).
- Adjust to minimum amplitude by means of 3741.

4. Rf-AGC adjustment (3742) :

- Supply a PAL white picture with an amplitude of 2,2 mV_{eff} (67 $dB_{\mu V}$) with sound carrier but without ton modulation.
- Connect an oscilloskope to tuner 1701 pin 17.
- Adjust to 550 mV_{ss} +50mV/-0mV by means of 3742.

5. Adjustment of the video output level (3761) (N3/5):

(only for teletext sets)

- Apply a standard video signal to the aerial input.
- Connect an oscilloskope to emitter of E- 7761.
- Adjust resistor 3761 for output voltage 0,9 Vss ± 0.05 V.

LINEAR AUDIO

1. Setting of the erasing frequency (5603) :

- Bring unit into mode "RECORD".
- Connect frequency meter to resistor 3618.
- Set erasing frequency to 70 kHz ± 2,5 kHz with 5603

2. Setting of the bias current (BIAS) (3618) :

- Connect millivoltmeter to 3618 (differential measurement)
- Bring unit into mode "RECORD"
- Set voltage at 3618 to 16 mV_{eff} (70 kHz) with 3618.

Checking the bias setting :

After "BIAS" has been set with the indicated approximate value, make a music recording with linear audio alone. Use cassettes made by well-known manufacturers, but do not use chromium dioxide tape. When reproducing this recording, note whether the highs are sufficiently reproduced or whether the sound is not subject to distortion. If the share of the highs is not sufficient, the "BIAS" current must be reduced; if distortion is too great, it must be increased.

3. **Playback - amplitude setting (3606) :**

- Record a signal 500 mVeff, 1 kHz.
- Connect millivoltmeter to the Scart1 pin1 (audio output). Reproduce this recording
- Set the playback amplitude to 500 mV_{eff} ± 50 mV with 3606

DECKELECTRONIC :

Software adjustment of the GAP :

- Insert a test cassette with norm video signal (for ex. 4822 397 30103)
- Select SERVICE mode. (press approx. 5 sec. STOP on RC and PLAY on the recorder
- Press PLAY on RC and EJECT on the recorder.

Thereby the automatical adjustment is released and stored in the EEPROM.
If the adjustment has been successfuly done, the recorder gets automatically in STAND BY mode.
If the adjustment has not been made correctly, the recorder rejects the cassette.

Reasons: The norm-video signal is out of order
Bad scanner
Microprocessor is defect.

POWER SUPPLY MSM, NSM

Adjustment of the output voltage.
MSM1 : 3204
NSM : 3090

- Connect a voltmeter to connection 9 or 11 of the plug SM1
- Adjust to an output voltage of 5,4 V ± 0,03 V .

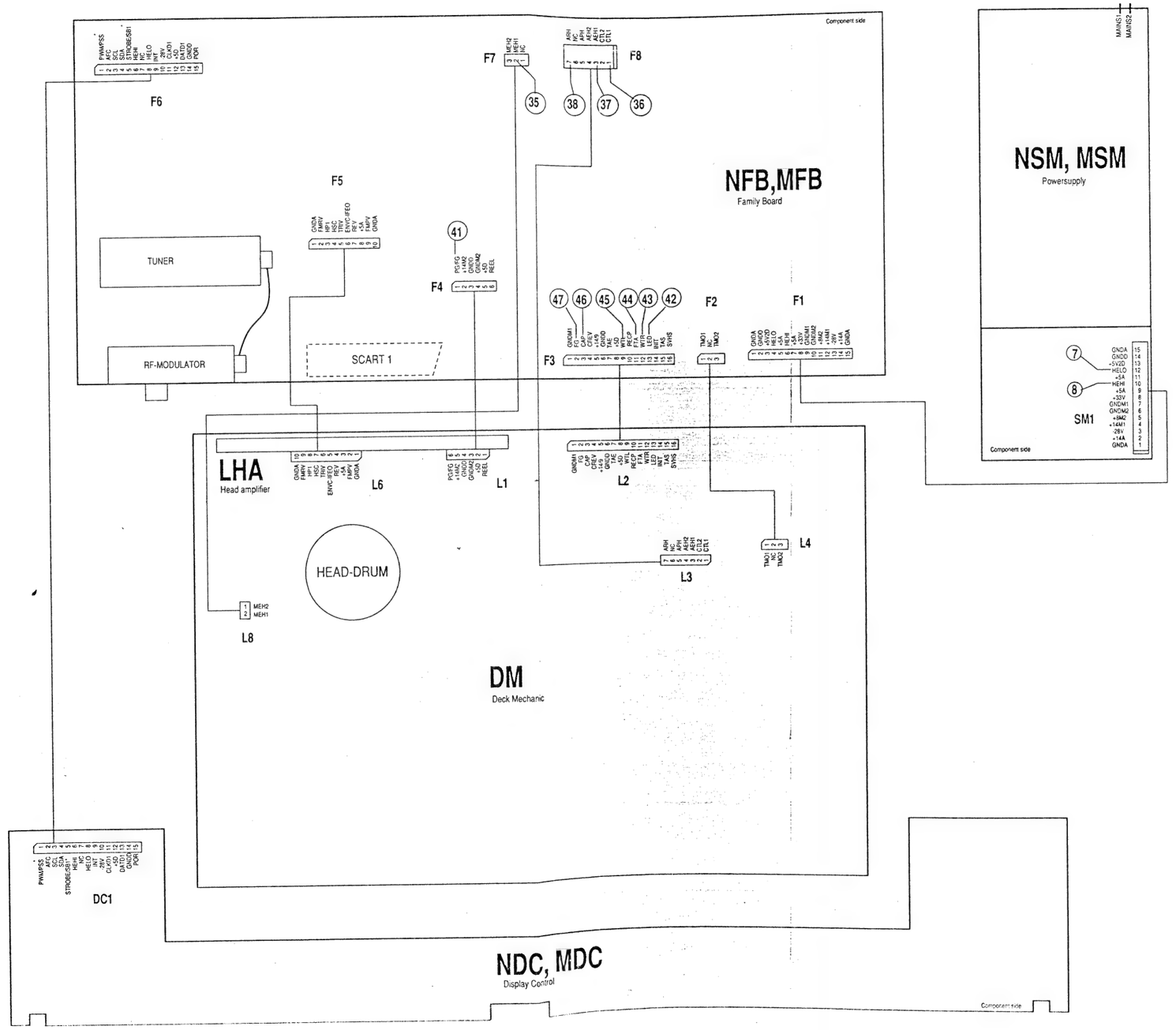
MDC., NDC ADJUSTMENTS :

Setting the clock frequency (2005) :

- Disconnect the set from the mains.
- Connect a frequency counter to plug 1101 pin 1.
- Press the keys UP, DOWN and PLAY simultaneous.
- Connect the set to the mains.
- Touch pin3 plug 1101 at least 7 times with the earth cable.
- A 5 V squarewave signal has been applied to the frequency counter.
- Set C2005 at 47.36328 ms ± 75 ns.

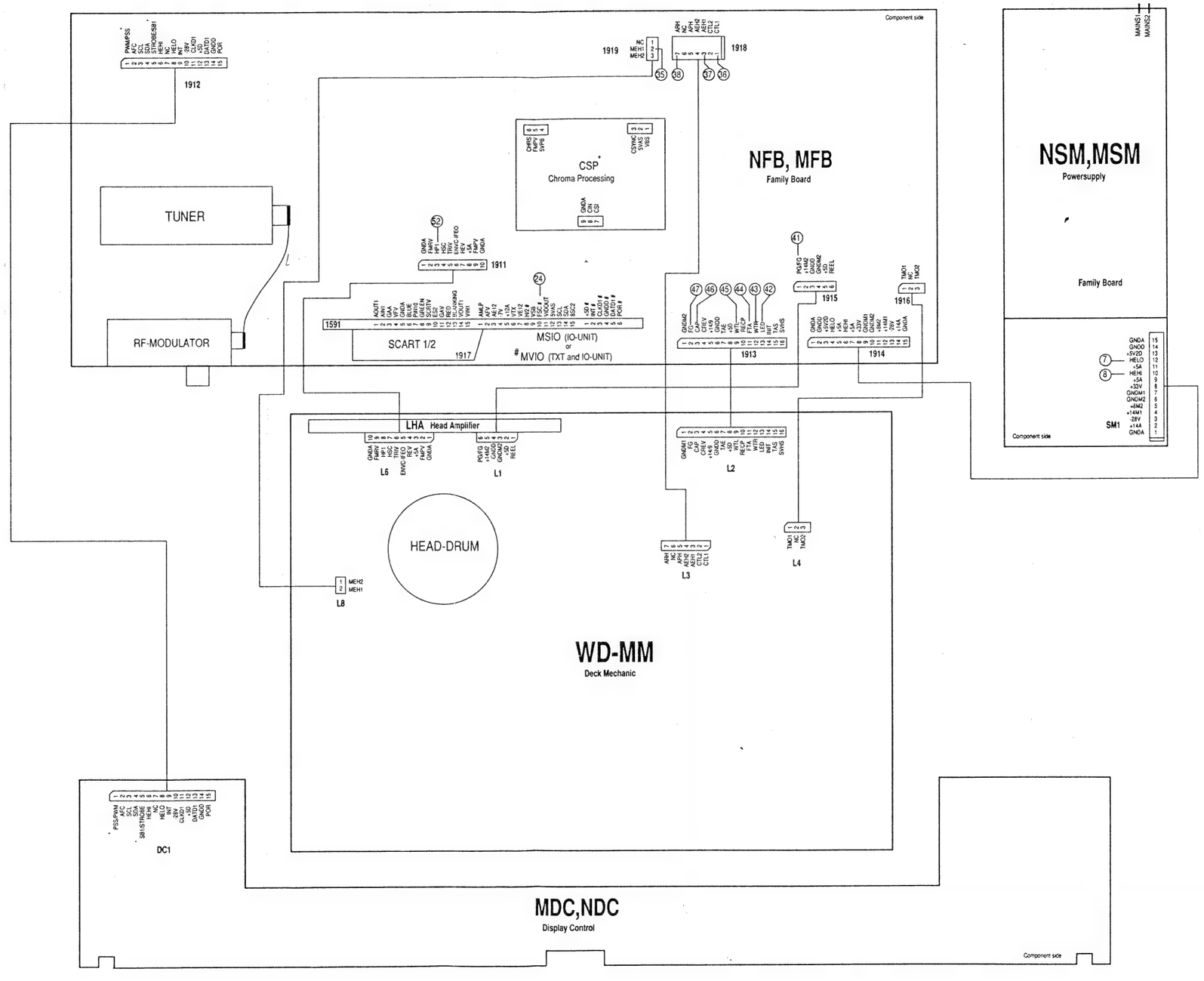
3-1

WIRING DIAGRAM N1 N2



* ... SIGNAL USED FOR SECAM SETS

WIRING DIAGRAM

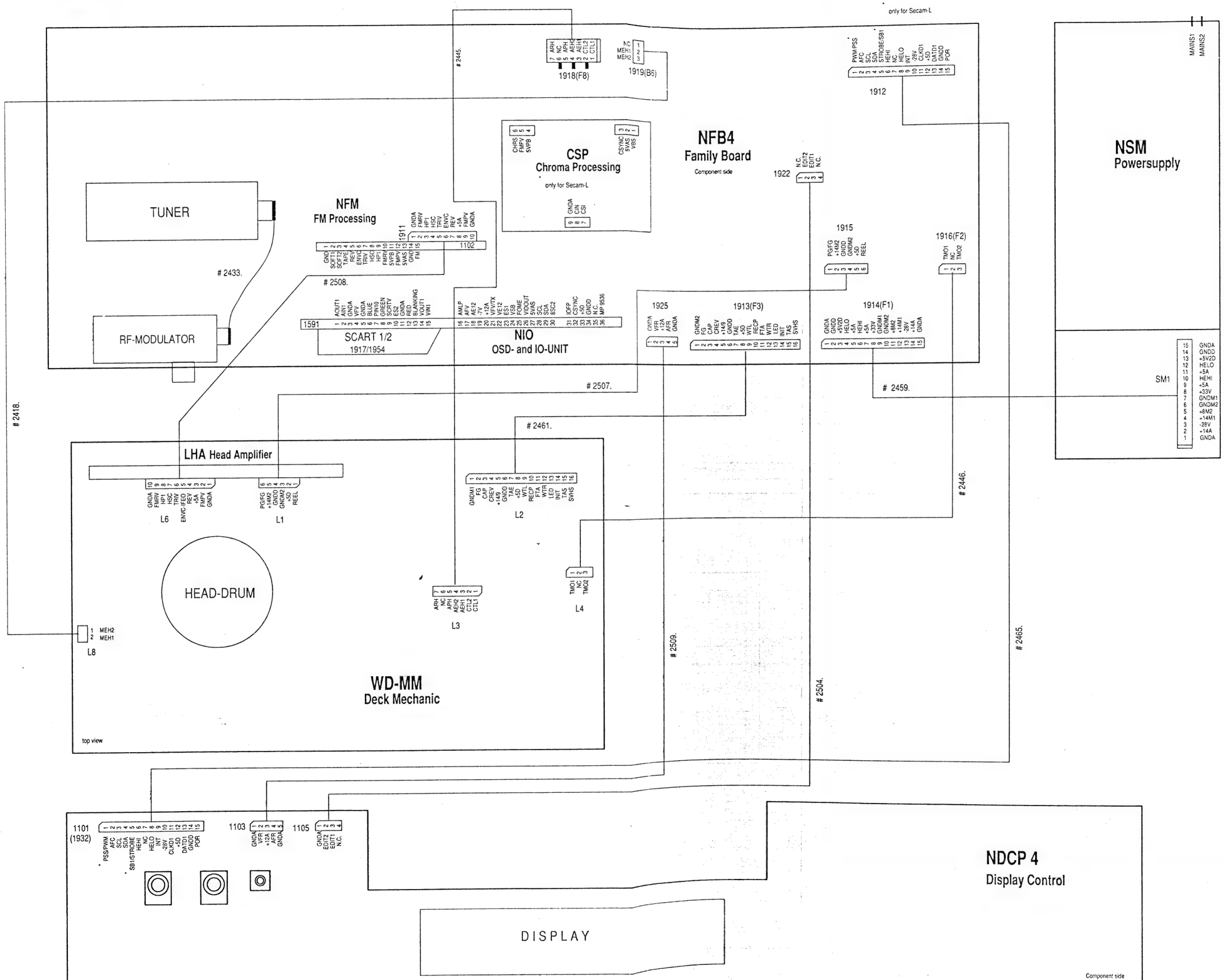


#.... ONLY FOR TXT

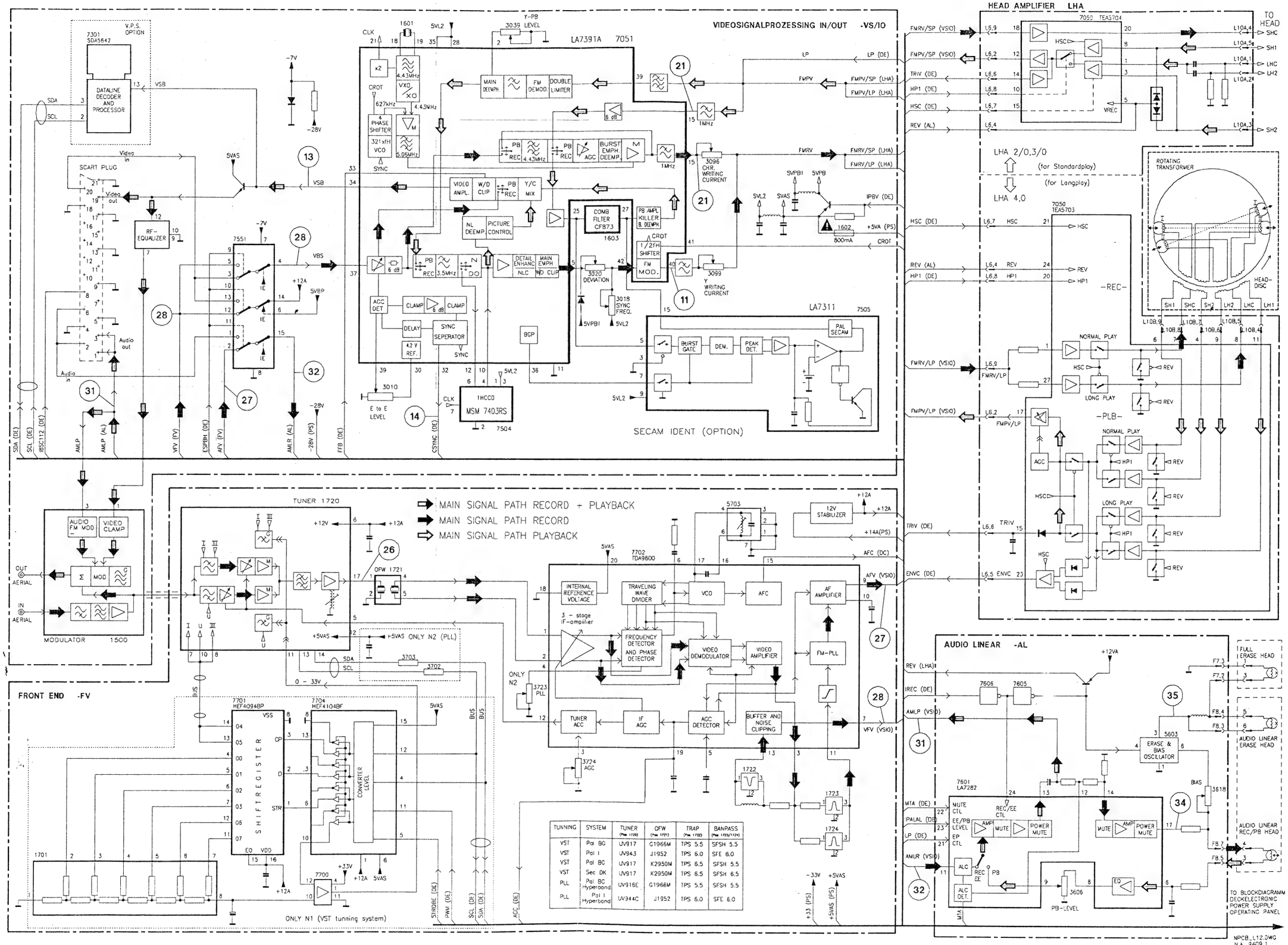
*.... ONLY FOR SECAM-L

3-3

WIRING DIAGRAM N4



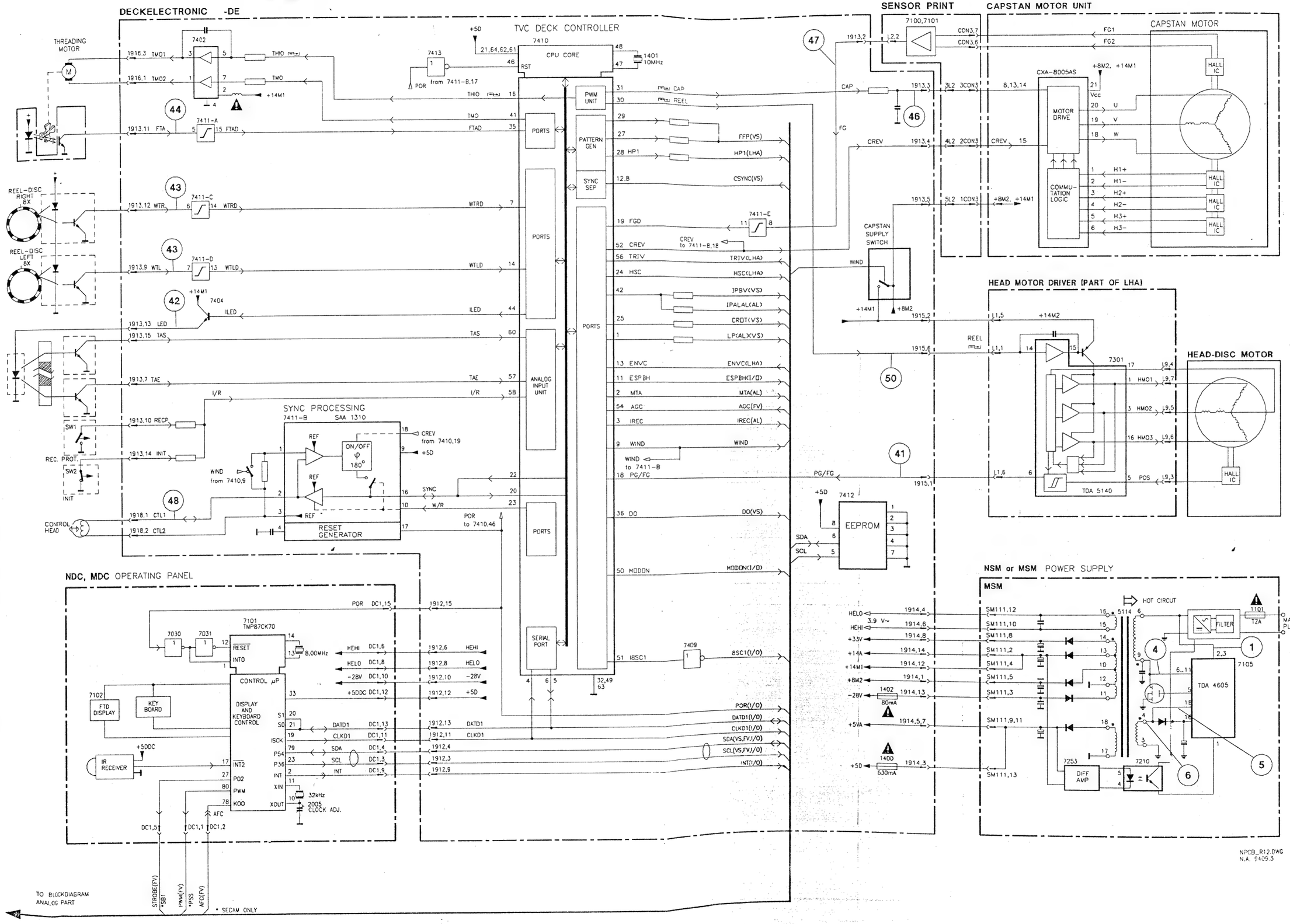
BLOCKDIAGRAM ANALOG PART N1 N2



PCS 74502

3-5

BLOCK DIAGRAM DIGITAL PART N1 N2

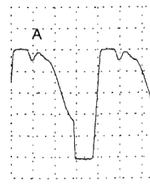


OSCILLOGRAM

A: DC, 0.2V/Div, 2us/Div

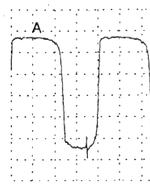
IC7105 Pin 2 Osc

A: DC, 0.1kV/Div, 2us/Div



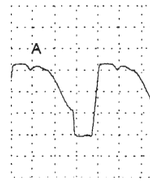
IC7105 Pin 6..11 Osc

A: DC, 0.2V/Div, 2us/Div



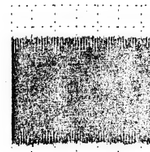
IC7105 Pin 18 Osc

A: DC, 10V/Div, 2us/Div



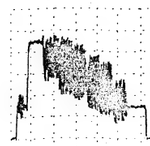
Trafo 5114 Pin 4 Osc

A: AC, 0.2 V/Div , 2 us/Div



IC7051 Pin 40 Osc

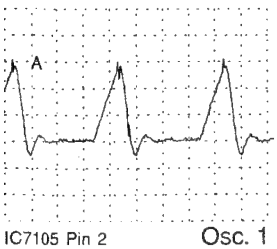
A: DC, 0.5 V/Div 10 us/Div



IC 7051 Pin 34 Osc
VSB

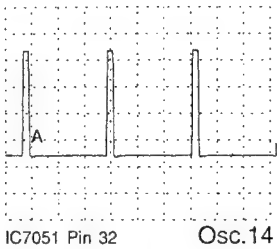
OSCILLOGRAMS BLOCK DIAGRAM

A: DC, 0.2V/Div, 2us/Div



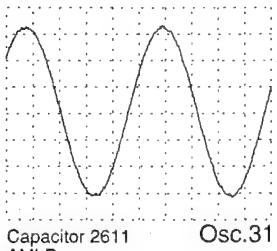
IC7105 Pin 2 Osc. 1

A: DC, 1.0 V/Div , 20 us/Div



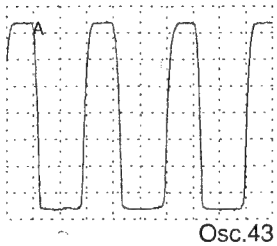
IC7051 Pin 32 Osc.14

A: DC, 0.2 V/Div, 0.2 ms/Div



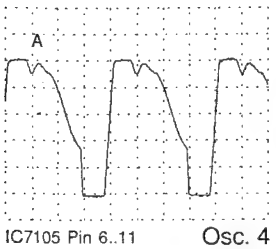
Capacitor 2611 Osc.31
AMLP

A: DC, 0.5 V/Div, 2 ms/Div



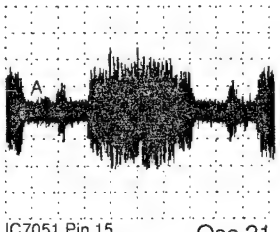
Osc.43

A: DC, 0.1kV/Div, 2us/Div



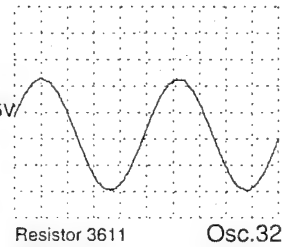
IC7105 Pin 6..11 Osc. 4

A: AC, 0.2 V/Div , 10 us/Div



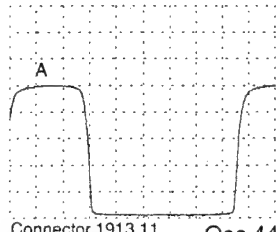
IC7051 Pin 15
(measured in play) Osc.21

A: DC, 0.2 V/Div, 0.2 ms/Div



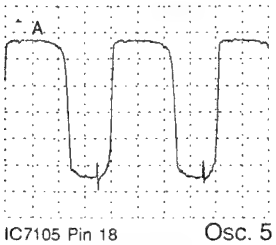
Resistor 3611 Osc.32
AMLR

A: DC, 1 V/Div, 2 ms/Div



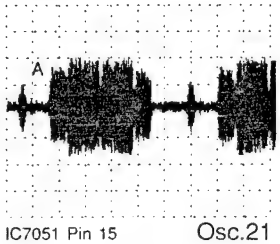
Connector 1913,11 Osc.44
FTA Threading

A: DC, 0.2V/Div, 2us/Div



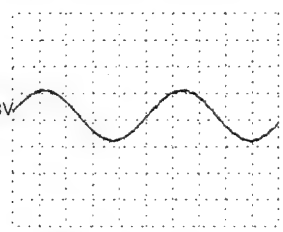
IC7105 Pin 18 Osc. 5

A: AC, 0.1 V/Div , 10 us/Div



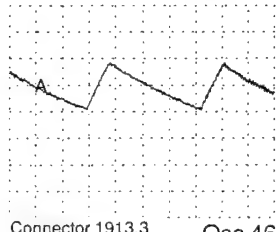
IC7051 Pin 15 Osc.21

A: DC, 1 V/Div, 0.2 ms/Div



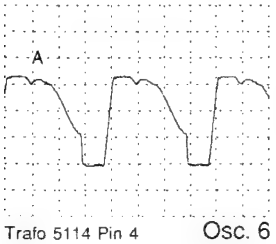
IC 7601 Pin 17 Osc.34

A: DC, 0.2 V/Div, 10 us/Div



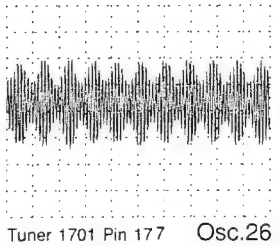
Connector 1913,3 Osc.46
CAP

A: DC, 10V/Div, 2us/Div



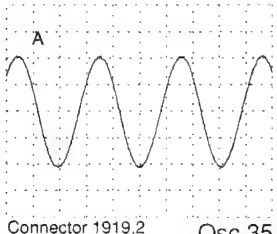
Trafo 5114 Pin 4 Osc. 6

A: DC, 0.1 V/Div 0.2 us/Div



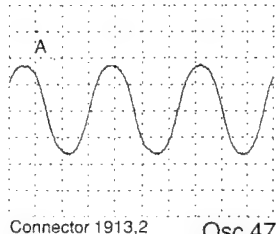
Tuner 1701 Pin 177 Osc.26

A: DC, 10 V/Div, 5 us/Div



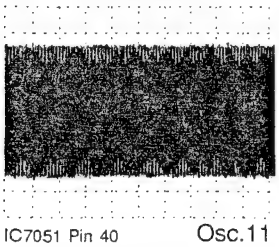
Connector 1919,2 Osc.35
Main erase head
1)

A: AC, 0.5 V/Div, 0.2 ms/Div



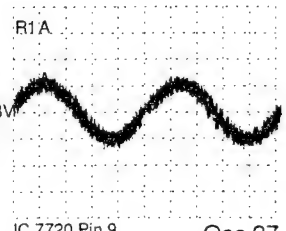
Connector 1913,2 Osc.47
FG

A: AC, 0.2 V/Div , 2 us/Div



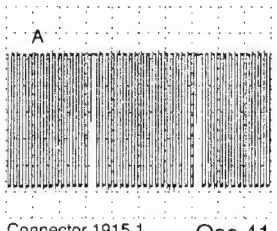
IC7051 Pin 40 Osc.11

A: DC, 0.5 V/Div 0.2 ms/Div



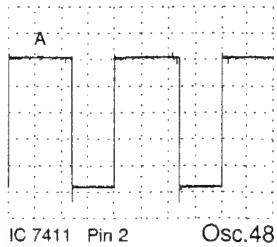
IC 7720 Pin 9 Osc.27
AFV

A: DC, 1 V/Div, 10 ms/Div



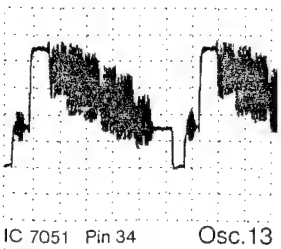
Connector 1915,1 Osc.41
PG/FG

A: DC, 1 V/Div, 10 ms/Div



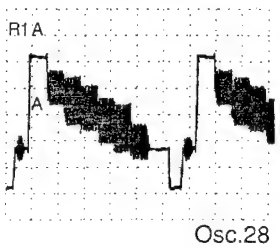
IC 7411 Pin 2 Osc.48
CTL1 REC

A: DC, 0.5 V/Div 10 us/Div



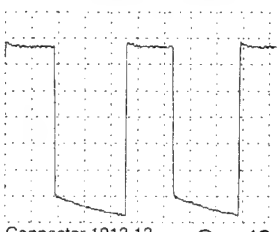
IC 7051 Pin 34 Osc.13
VSB

A: DC, 0.2 V/Div 10 us/Div



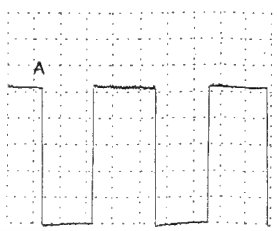
Osc.28

A: DC, 0.5 V/Div, 0.5 ms/Div



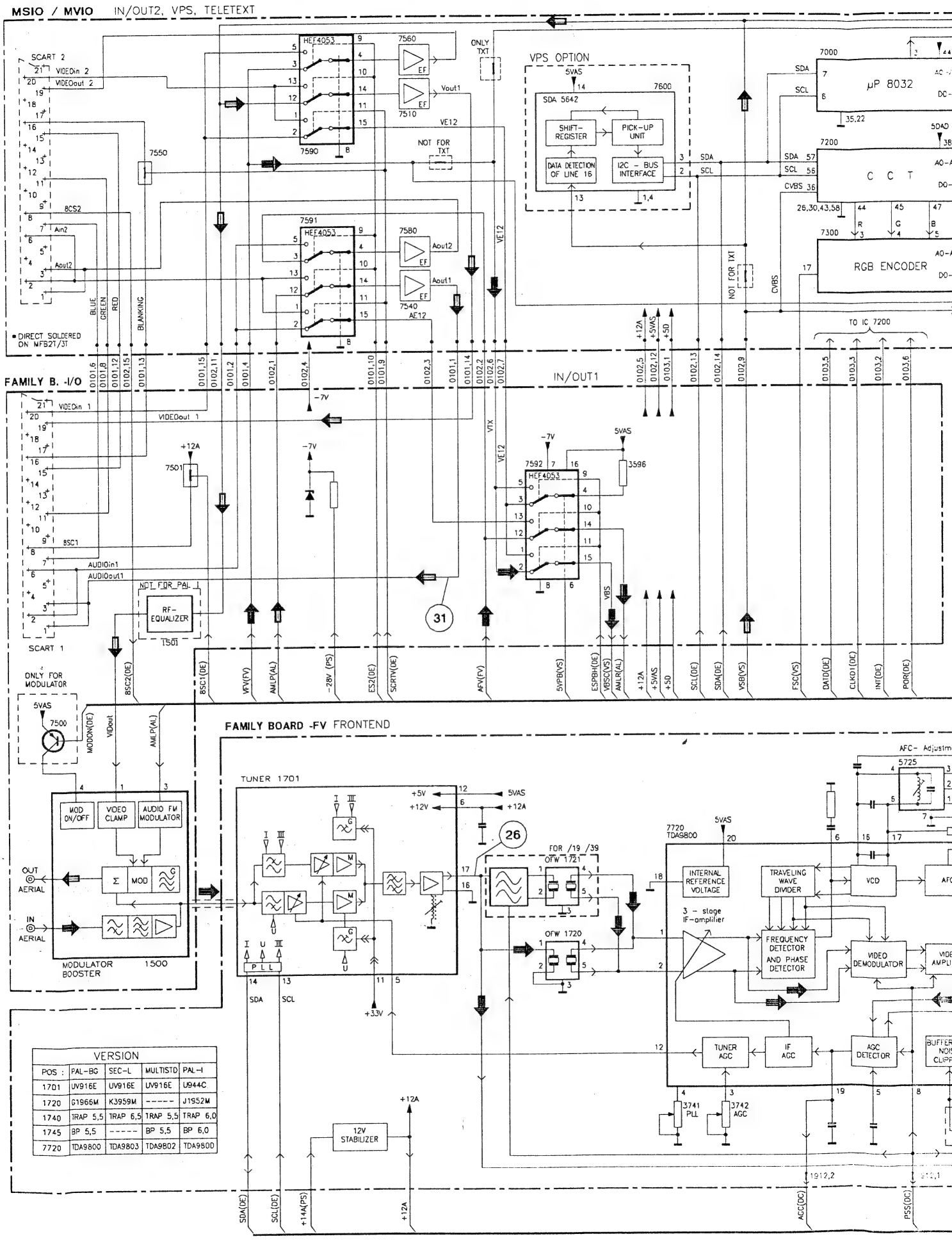
Connector 1913,13 Osc.42
LED

A: DC, 1 V/Div, 10 us/Div

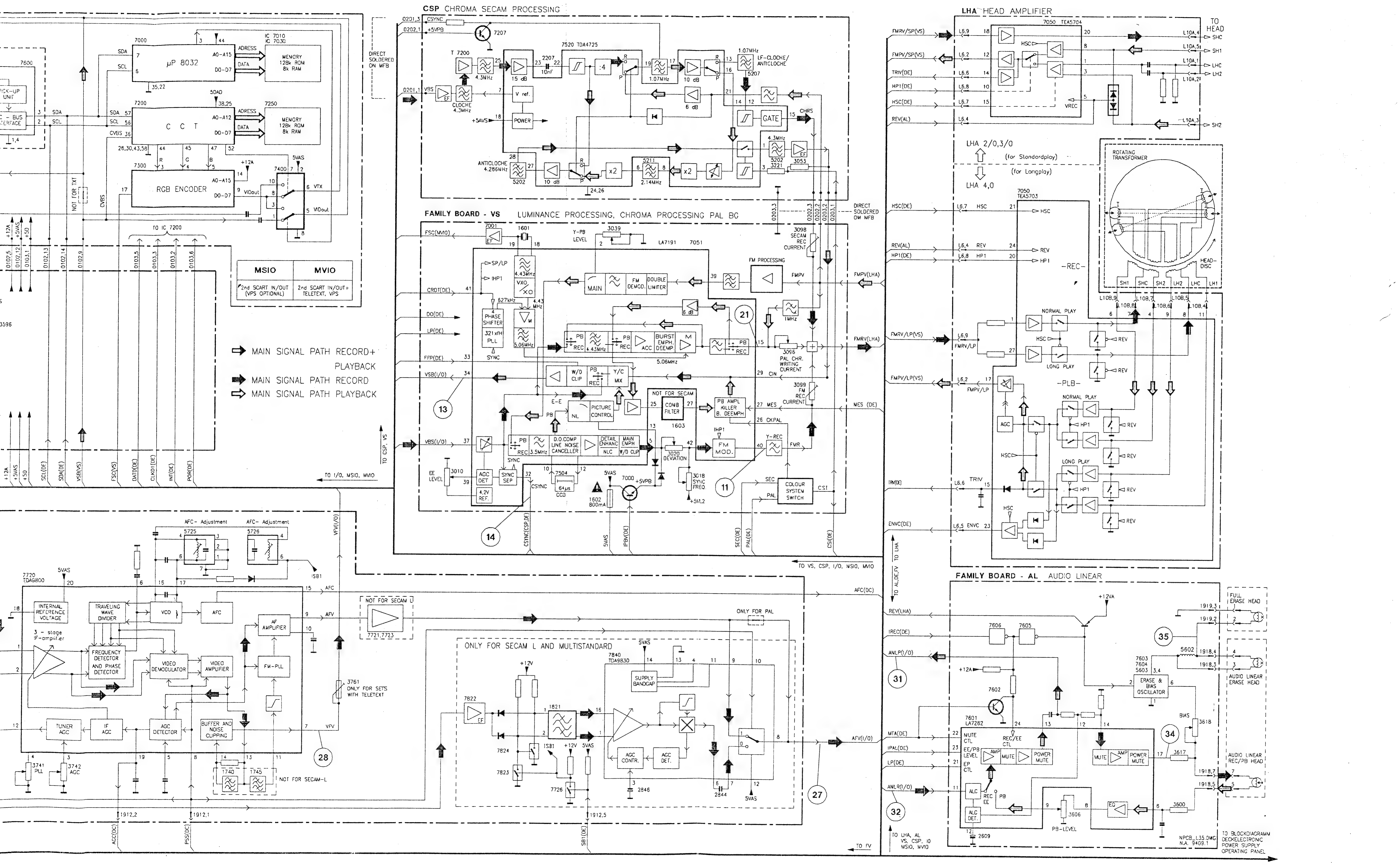


IC 7410 Osc.50
REEL

BLOCK DIAGRAM ANALOG PART N3 N5



VERSION				
POS :	PAL-BG	SEC-L	MULTISTD	PAL-I
1701	UV916E	UV916E	UV916E	U944C
1720	G1966M	K3959M	-----	J1952M
1740	TRAP 5,5	TRAP 6,5	TRAP 5,5	TRAP 6,0
1745	BP 5,5	-----	BP 5,5	BP 6,0
7720	TDA9800	TDA9803	TDA9802	TDA9800


CSP CHROMA SECAM PROCESSING
7520 TDA4725
DIRECT SOLDERED ON MFB
FAMILY BOARD - VS LUMINANCE PROCESSING, CHROMA PROCESSING PAL BC
LA7191 7051
FM PROCESSING
NOT FOR SECAM
COMB FILTER
COLOUR SYSTEM SWITCH
LHA HEAD AMPLIFIER
7050 TEA5704
TO HEAD
LHA 2/0,3/0 (for Standardplay)
LHA 4,0 (for Longplay)
ROTATING TRANSFORMER
HEAD-DISC
NORMAL PLAY
LONG PLAY
-REC-
-PLB-
µP 8032
MEMORY 128k ROM 8k RAM
C C T
RGB ENCODER
NOT FOR TXT
MSIO
MVIO
2nd SCART IN/OUT (VPS OPTIONAL)
2nd SCART IN/OUT+ TELETEXT, VPS
TO IC 7200
MAIN SIGNAL PATH RECORD+ PLAYBACK
MAIN SIGNAL PATH RECORD
MAIN SIGNAL PATH PLAYBACK
TO I/O, MSIO, MVIO
TO CSP, VS
TO VS, CSP, I/O, MSIO, MVIO
AFC- Adjustment
7720 TDA9800
INTERNAL REFERENCE VOLTAGE
TRAVELING WAVE DIVIDER
3 - stage IF-amplifier
FREQUENCY DETECTOR AND PHASE DETECTOR
VIDEO DEMODULATOR
VIDEO AMPLIFIER
AF AMPLIFIER
FM-PLL
TUNER AGC
IF AGC
AGC DETECTOR
BUFFER AND NOISE CLIPPING
NOT FOR SECAM-L
NOT FOR SECAM L
7721,7723
ONLY FOR SETS WITH TELETEXT
ONLY FOR SECAM L AND MULTISTANDARD
7840 TDA9830
SUPPLY BANDGAP
AGC CONTR.
AGC DET.
ONLY FOR PAL
FAMILY BOARD - AL AUDIO LINEAR
FULL ERASE HEAD
AUDIO LINEAR ERASE HEAD
AUDIO LINEAR REC/PB HEAD
ERASE & BIAS OSCILLATOR
7601 LA7282
PB-LEVEL
TO ALDE/FV TO LHA
TO LHA, AL VS, CSP, I/O MSIO, MVIO
TO FV
NPCB_L35.DWG N.A. 9409.1
TO BLOCKDIAGRAMM DECKELECTRONIC POWER SUPPLY OPERATING PANEL

3-7

BLOCK DIAGRAM DIGITAL PART N3 N5

FAMILY BOARD - DE DECKELECTRONICS

TVC DECK CONTROLLER

7410 80C252 CPU CORE

SENSOR PRINT

CAPSTAN MOTOR UNIT

CAPSTAN MOTOR

CXA-8005AS

HEAD MOTOR DRIVER (PART OF LHA)

HEAD-DISC MOTOR

SYNC PROCESSING 7411-B SAA 1310

MDC, NDC OPERATING PANEL

7101 TMP87CK70

NSM or MSM POWER SUPPLY

MSM

EEPROM 7412

TO BLOCKDIAGRAM ANALOG PART

* SECAM ONLY

NPCB_R35.DWG N.A. 5405.2

OSCILLOGR

A: DC, 0.2V/Div, 2us/D

IC7105 Pin 2

A: DC, 0.1kV/Div, 2us

IC7105 Pin 6..11

A: DC, 0.2V/Div, 2us/D

IC7105 Pin 18

A: DC, 10V/Div, 2us/D

Trafo 5114 Pin 4

A: AC, 0.2 V/Div , 2 us

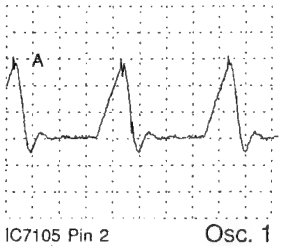
IC7051 Pin 40

A: DC, 0.5 V/Div 10 us

IC 7051 Pin 34
VSB

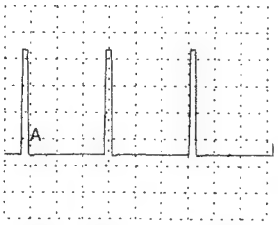
OSCILLOGRAMS BLOCK DIAGRAM

A: DC, 0.2V/Div, 2us/Div



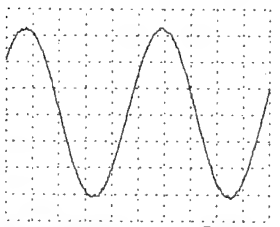
IC7105 Pin 2 Osc. 1

A: DC, 1.0 V/Div , 20 us/Div



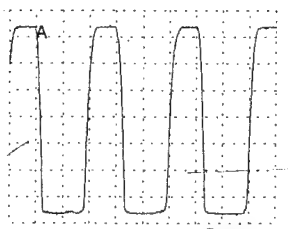
IC7051 Pin 32 Osc.14

A: DC, 0.2 V/Div, 0.2 ms/Div



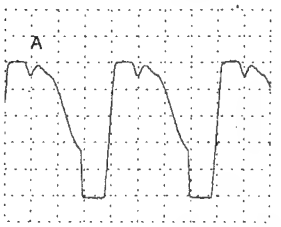
Capacitor 2611 AMLP Osc.31

A: DC, 0.5 V/Div, 2 ms/Div



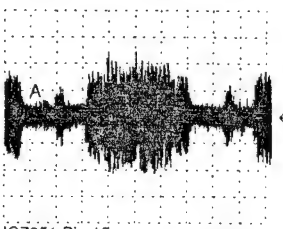
Osc.43

A: DC, 0.1kV/Div, 2us/Div



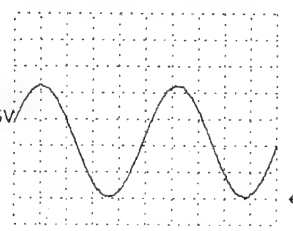
IC7105 Pin 6..11 Osc. 4

A: AC, 0.2 V/Div , 10 us/Div



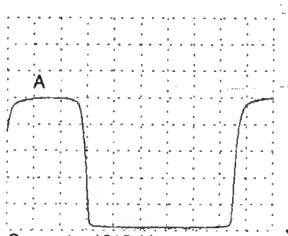
IC7051 Pin 15 (measured in play) Osc.21

A: DC, 0.2 V/Div, 0.2 ms/Div



Resistor 3611 AMLR Osc.32

A: DC, 1 V/Div, 2 ms/Div

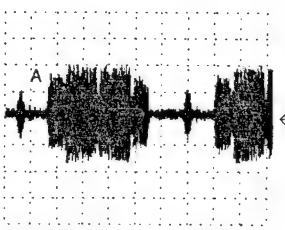


Connector 1913,11 FTA Threading Osc.44

A: DC, 0.2V/Div, 2us/Div

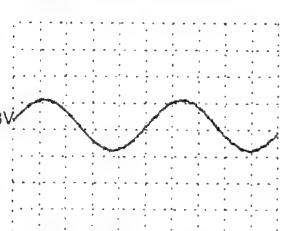
IC7105 Pin 18 Osc. 5

A: AC, 0.1 V/Div , 10 us/Div



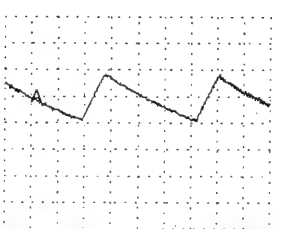
IC7051 Pin 15 Osc.21

A: DC, 1 V/Div, 0.2 ms/Div



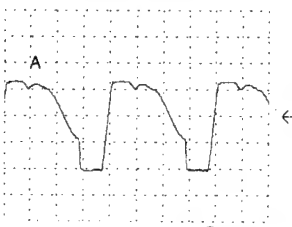
IC 7601 Pin 17 Osc.34

A: DC, 0.2 V/Div, 10 us/Div



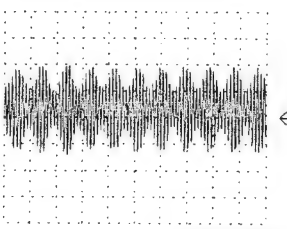
Connector 1913,3 CAP Osc.46

A: DC, 10V/Div, 2us/Div



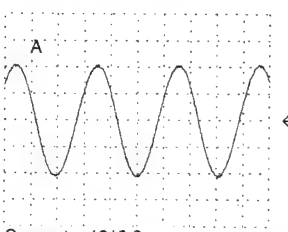
Trafo 5114 Pin 4 Osc. 6

A: DC, 0.1 V/Div 0.2 us/Div



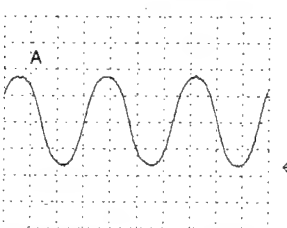
Tuner 1701 Pin 177 Osc.26

A: DC, 10 V/Div, 5 us/Div



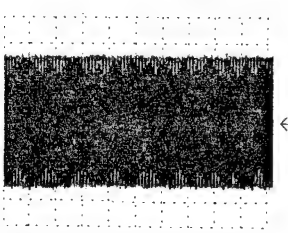
Connector 1919,2 Main erase head Osc.35 1)

A: AC, 0.5 V/Div, 0.2 ms/Div



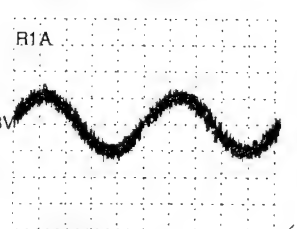
Connector 1913,2 FG Osc.47

A: AC, 0.2 V/Div , 2 us/Div



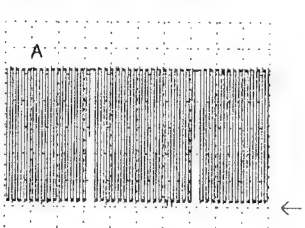
IC7051 Pin 40 Osc.11

A: DC, 0.5 V/Div 0.2 ms/Div



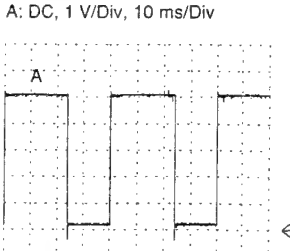
IC 7720 Pin 9 AFV Osc.27

A: DC, 1 V/Div, 10 ms/Div



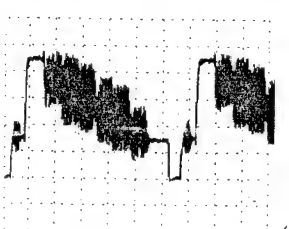
Connector 1915,1 PG/FG Osc.41

A: DC, 1 V/Div, 10 ms/Div



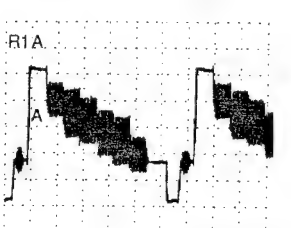
IC 7411 Pin 2 CTL1 REC Osc.48

A: DC, 0.5 V/Div 10 us/Div



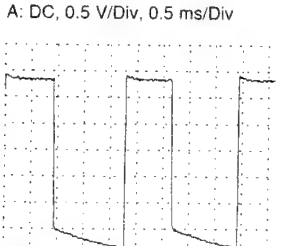
IC 7051 Pin 34 VSB Osc.13

A: DC, 0.2 V/Div 10 us/Div



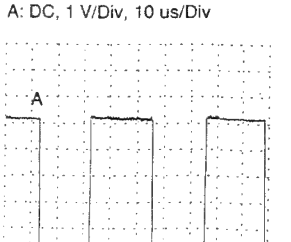
Osc.28

A: DC, 0.5 V/Div, 0.5 ms/Div



Connector 1913,13 LED Osc.42

A: DC, 1 V/Div, 10 us/Div

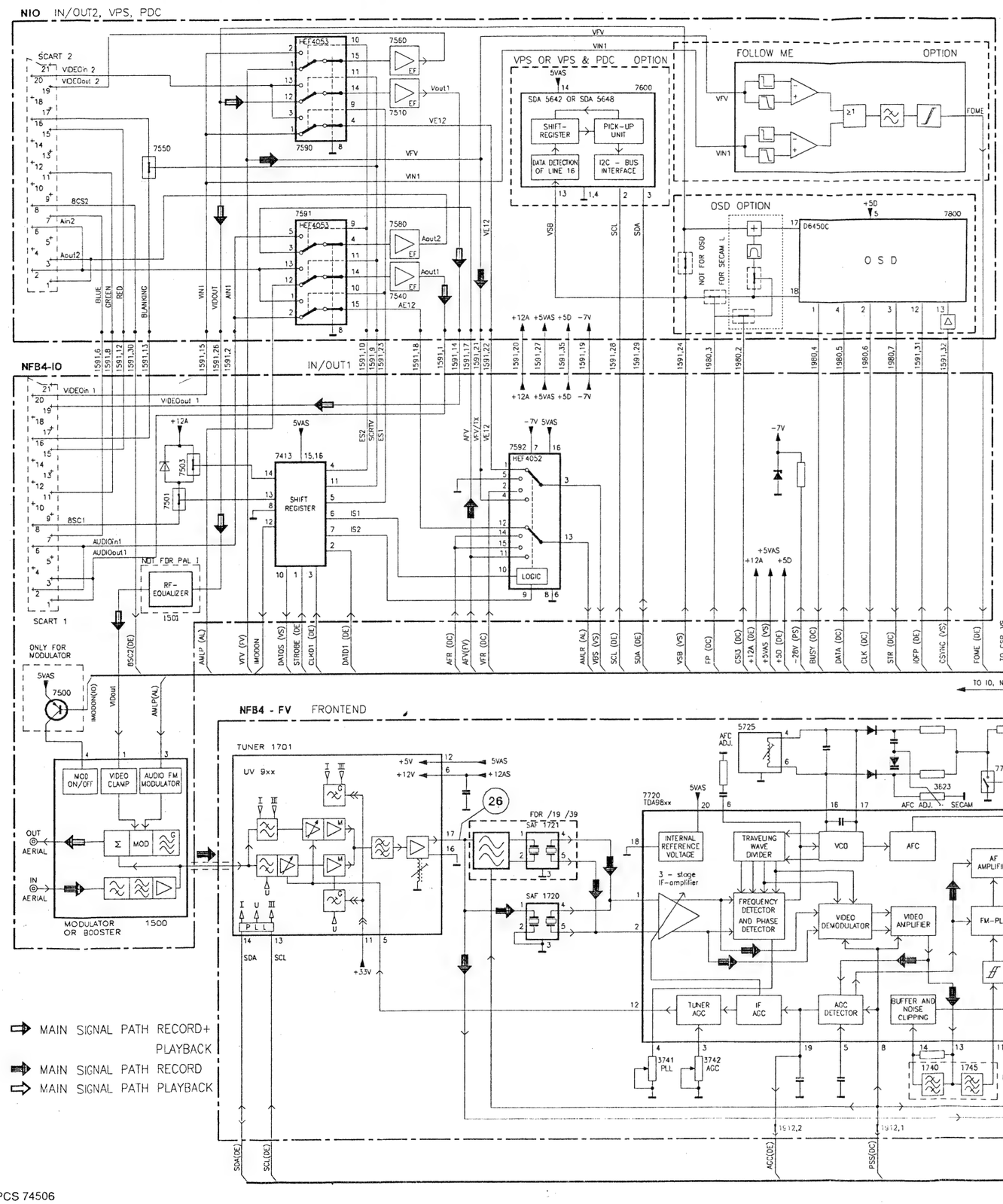


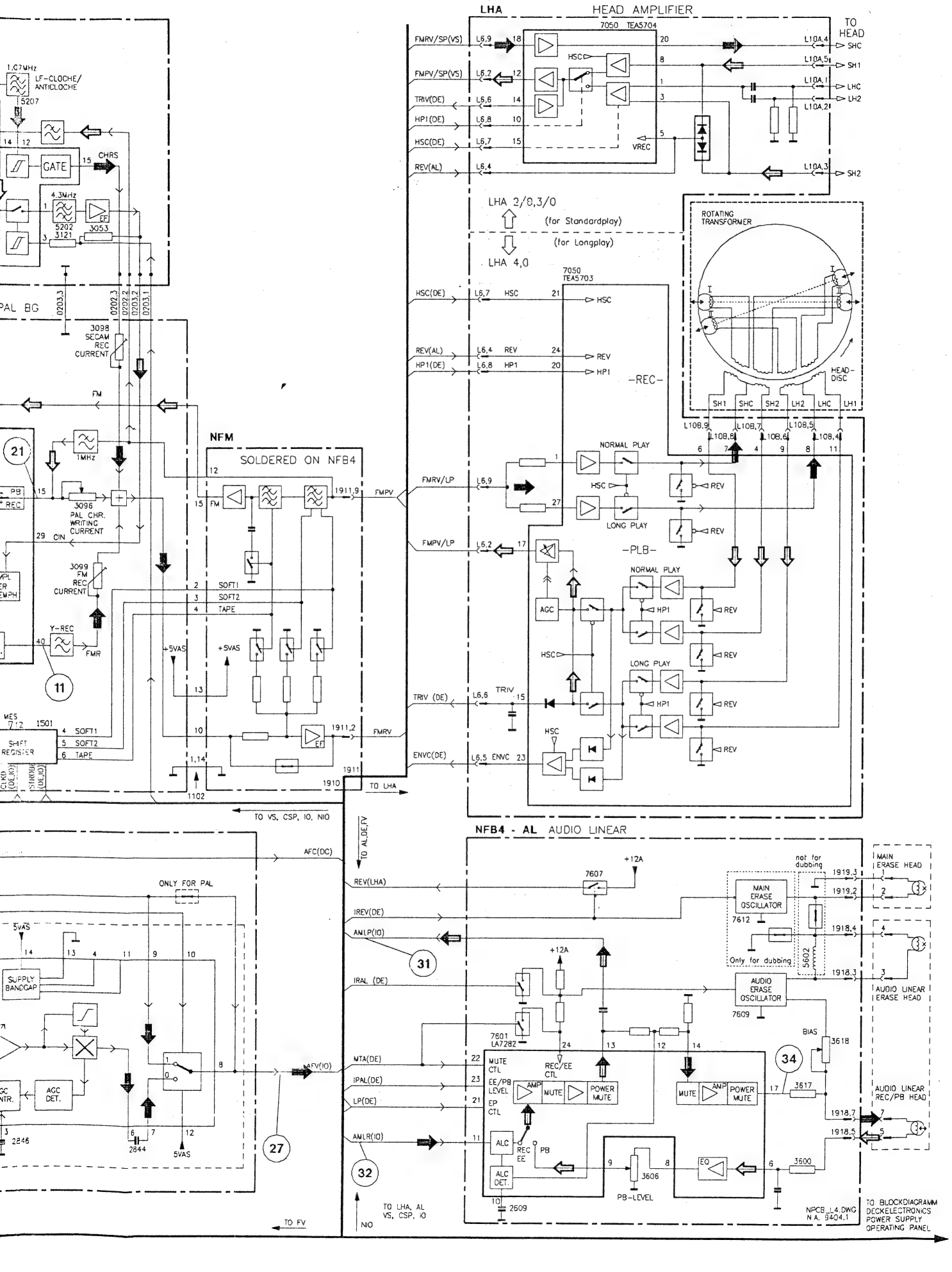
IC 7410 REEL Osc.50

PCS 74505

3-8 3-8

BLOCK DIAGRAM ANALOG PART N4




LHA
HEAD AMPLIFIER
7050 TEA5704
TO HEAD
FMRV/SP(VS)
FMPV/SP(VS)
TRIV(DE)
HP1(DE)
HSC(DE)
REV(AL)
HSC
VREC
L10A,4 SHC
L10A,5 SH1
L10A,1 LHC
L10A,2 LH2
L10A,3 SH2
LHA 2/0,3/0
(for Standardplay)
(for Longplay)
LHA 4,0
ROTATING TRANSFORMER
HEAD-DISC
SH1 SHC SH2 LH2 LHC LH1
7050 TEA5703
-REC-
NORMAL PLAY
LONG PLAY
-PLB-
NFM
SOLDERED ON NFB4
1,07MHz
LF-CLOCHE/ ANTICLOCHE
5207
GATE
CHRS
4,3MHz
5202
3121
3053
PAL BG
3098 SECAM REC CURRENT
3096 PAL CHR. WRITING CURRENT
3099 FM REC CURRENT
Y-REC
FMR
SOFT1
SOFT2
TAPE
SHIFT REGISTER
+5VAS
1MHz
TO LHA
TO VS, CSP, IO, NIO
NFB4 - AL AUDIO LINEAR
TO AL,DE,FV
AFC(DC)
REV(LHA)
IREV(DE)
AMLP(IO)
IRAL (DE)
MTA(DE)
IPAL(DE)
LP(DE)
AMLR(IO)
AFV(IO)
ONLY FOR PAL
SUPPLY BANDGAP
AGC DET.
MUTE CTL
EE/PB LEVEL
EP CTL
REC/EE CTL
MUTE
POWER MUTE
ALC
ALC DET.
REC EE
PB
EQ
PB-LEVEL
+12A
7607
7612
7609
7601 LA7282
5602
3618
3617
3600
3606
2609
2846
2844
MAIN ERASE OSCILLATOR
AUDIO ERASE OSCILLATOR
not for dubbing
Only for dubbing
BIAS
MAIN ERASE HEAD
AUDIO LINEAR ERASE HEAD
AUDIO LINEAR REC/PB HEAD
TO LHA, AL VS, CSP, IO
NIO
TO FV
TO BLOCKDIAGRAMM DECKELECTRONICS POWER SUPPLY OPERATING PANEL
NPCB_L4.DWG N.A. 9404.1

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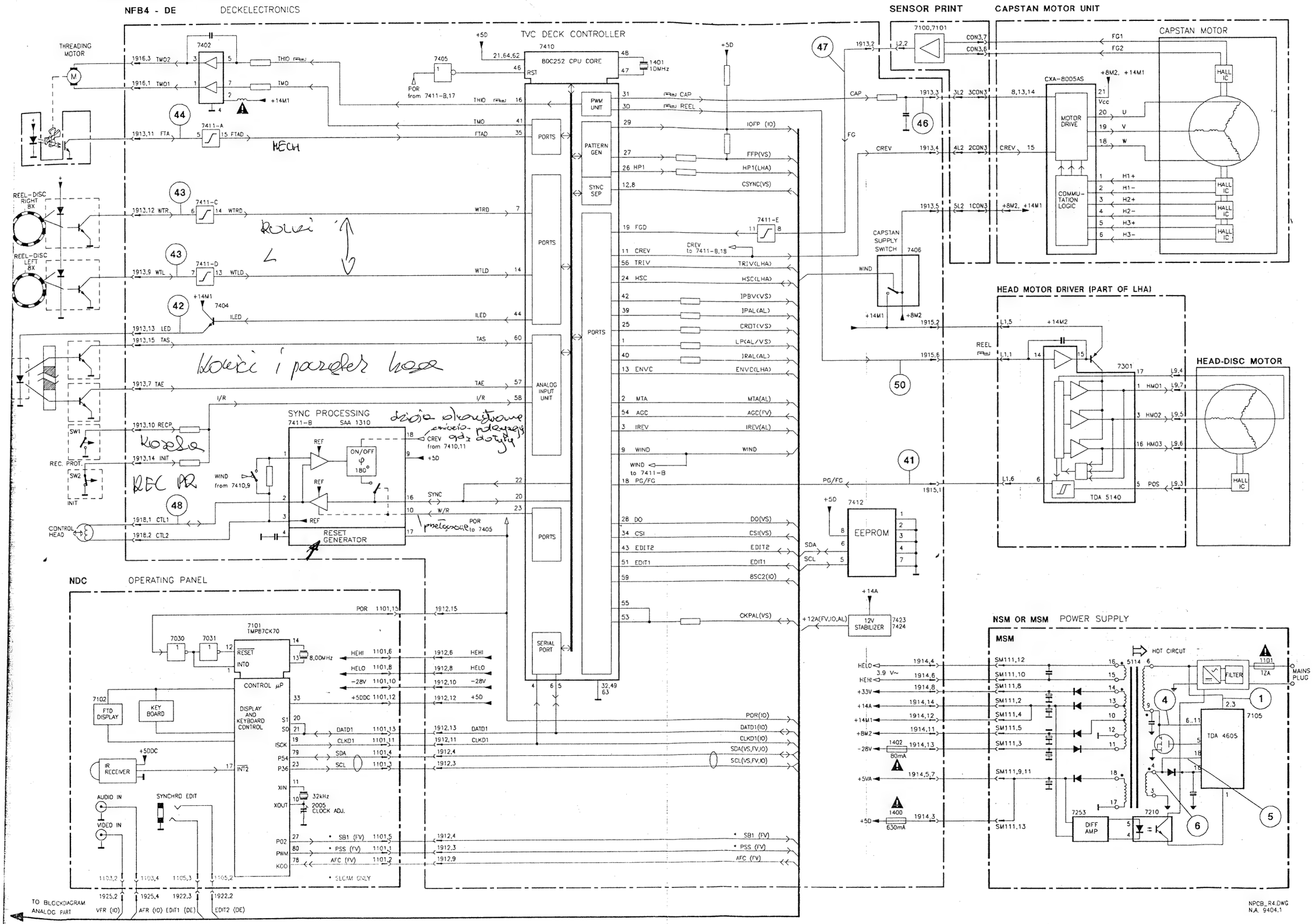
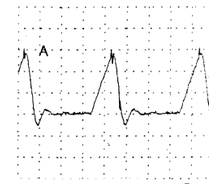
BLOCK DIAGRAM DIGITAL PART N4

NFB4 - DE DECKELECTRONICS



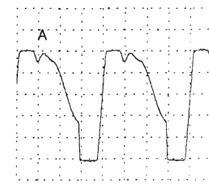
OSCILLOGRAM

A: DC, 0.2V/Div, 2us/Div



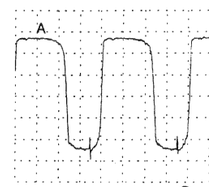
IC7105 Pin 2 Osc

A: DC, 0.1kV/Div, 2us/Div



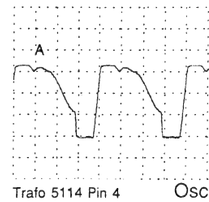
IC7105 Pin 6..11 Osc

A: DC, 0.2V/Div, 2us/Div



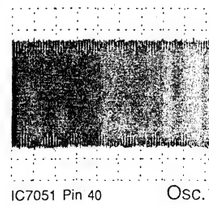
IC7105 Pin 18 Osc

A: DC, 10V/Div, 2us/Div



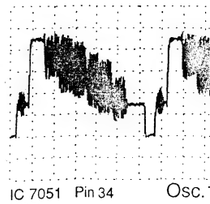
Trafo 5114 Pin 4 Osc

A: AC, 0.2 V/Div , 2 us/Div



IC7051 Pin 40 Osc.

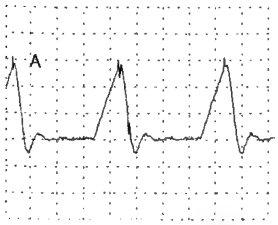
A: DC, 0.5 V/Div 10 us/Div



IC 7051 Pin 34 Osc.
VSB

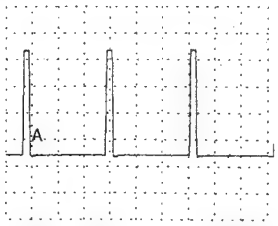
OSCILLOGRAMS BLOCK DIAGRAM

A: DC, 0.2V/Div, 2us/Div



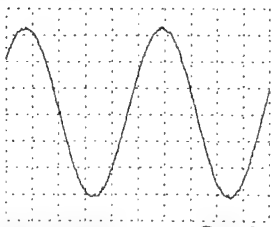
IC7105 Pin 2 Osc. 1

A: DC, 1.0 V/Div , 20 us/Div



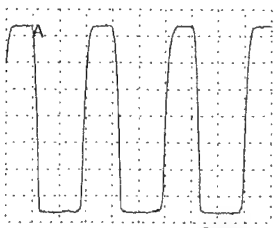
IC7051 Pin 32 Osc.14

A: DC, 0.2 V/Div, 0.2 ms/Div



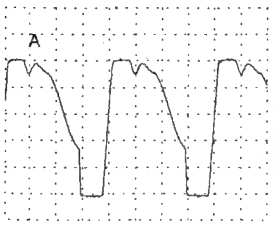
Capacitor 2611 AMLP Osc.31

A: DC, 0.5 V/Div, 2 ms/Div



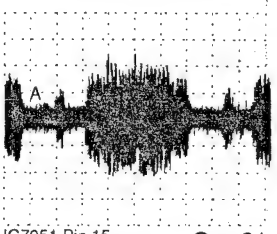
Osc.43

A: DC, 0.1kV/Div, 2us/Div



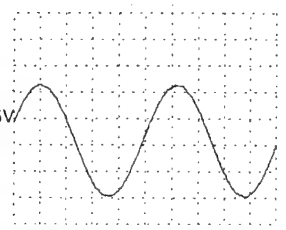
IC7105 Pin 6..11 Osc. 4

A: AC, 0.2 V/Div , 10 us/Div



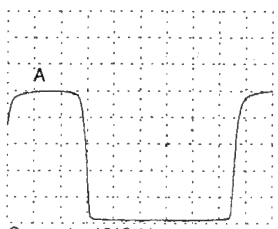
IC7051 Pin 15 (measured in play) Osc.21

A: DC, 0.2 V/Div, 0.2 ms/Div



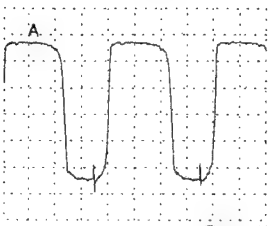
Resistor 3611 AMLR Osc.32

A: DC, 1 V/Div, 2 ms/Div



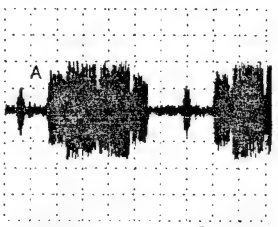
Connector 1913,11 FTA Threading Osc.44

A: DC, 0.2V/Div, 2us/Div



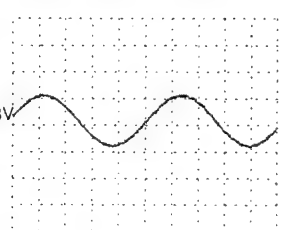
IC7105 Pin 18 Osc. 5

A: AC, 0.1 V/Div , 10 us/Div



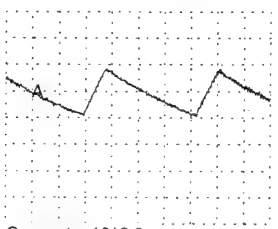
IC7051 Pin 15 Osc.21

A: DC, 1 V/Div, 0.2 ms/Div



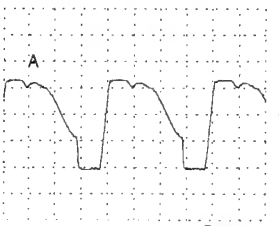
IC 7601 Pin 17 Osc.34

A: DC, 0.2 V/Div, 10 us/Div



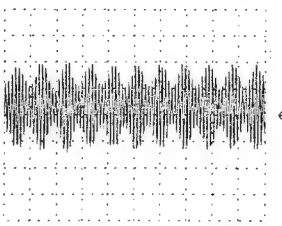
Connector 1913,3 CAP Osc.46

A: DC, 10V/Div, 2us/Div



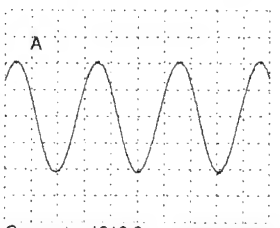
Trafo 5114 Pin 4 Osc. 6

A: DC, 0.1 V/Div 0.2 us/Div



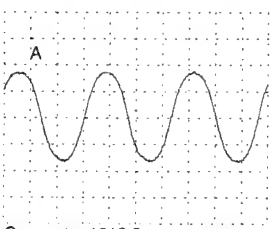
Tuner 1701 Pin 177 Osc.26

A: DC, 10 V/Div, 5 us/Div



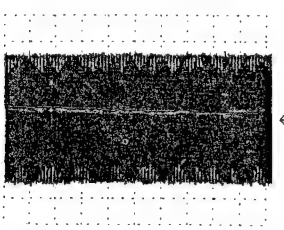
Connector 1919,2 Main erase head Osc.35 1)

A: AC, 0.5 V/Div, 0.2 ms/Div



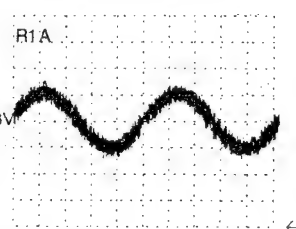
Connector 1913,2 FG Osc.47

A: AC, 0.2 V/Div , 2 us/Div



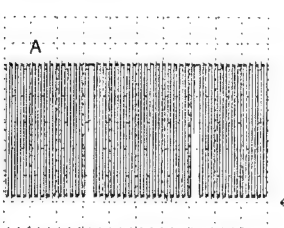
IC7051 Pin 40 Osc.11

A: DC, 0.5 V/Div 0.2 ms/Div



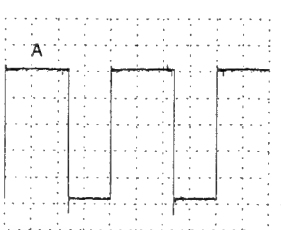
IC 7720 Pin 9 AFV Osc.27

A: DC, 1 V/Div, 10 ms/Div



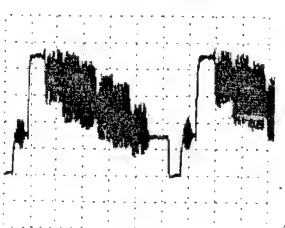
Connector 1915,1 PG/FG Osc.41

A: DC, 1 V/Div, 10 ms/Div



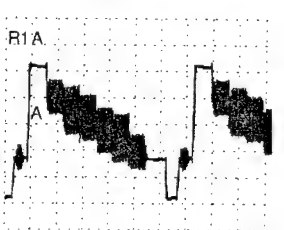
IC 7411 Pin 2 CTL1 REC Osc.48

A: DC, 0.5 V/Div 10 us/Div



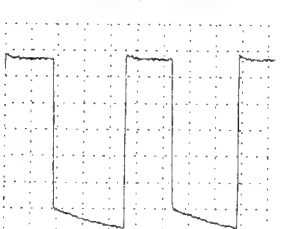
IC 7051 Pin 34 VSB Osc.13

A: DC, 0.2 V/Div 10 us/Div



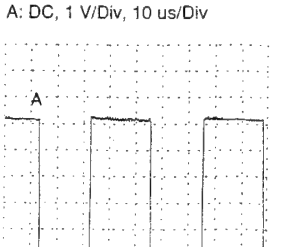
Osc.28

A: DC, 0.5 V/Div, 0.5 ms/Div



Connector 1913,13 LED Osc.42

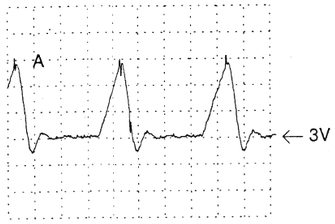
A: DC, 1 V/Div, 10 us/Div



IC 7410 REEL Osc.50

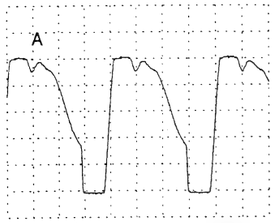
OSCILLOGRAMS POWER SUPPLY MSM1

A: DC, 0.2V/Div, 2us/Div



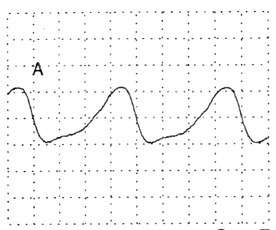
IC 7105/7110 Pin 2 Osc. 1

A: DC, 0.1kV/Div, 2us/Div



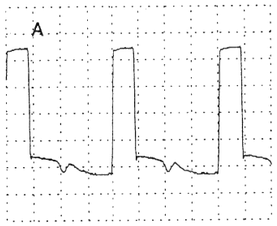
IC 7105 Pin 6..11 Osc. 4

A: DC, 5V/Div, 2us/Div



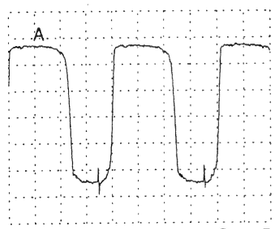
Connector SM1,12 Osc. 7
HELO

A: DC, 2V/Div, 2us/Div



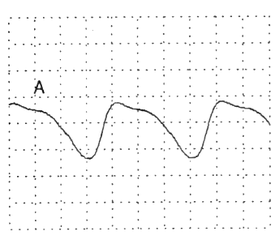
IC 7105 Pin 15 Osc. 2

A: DC, 0.2V/Div, 2us/Div



IC 7105 Pin 18 Osc. 5

A: DC, 5V/Div, 2us/Div

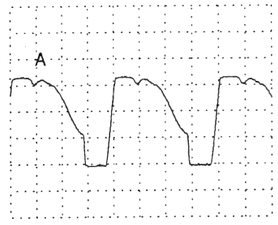


Connector SM1,10 Osc. 8
HEHI

A: DC, 2V/Div, 2us/Div

IC 7105 Pin 14 Osc. 3

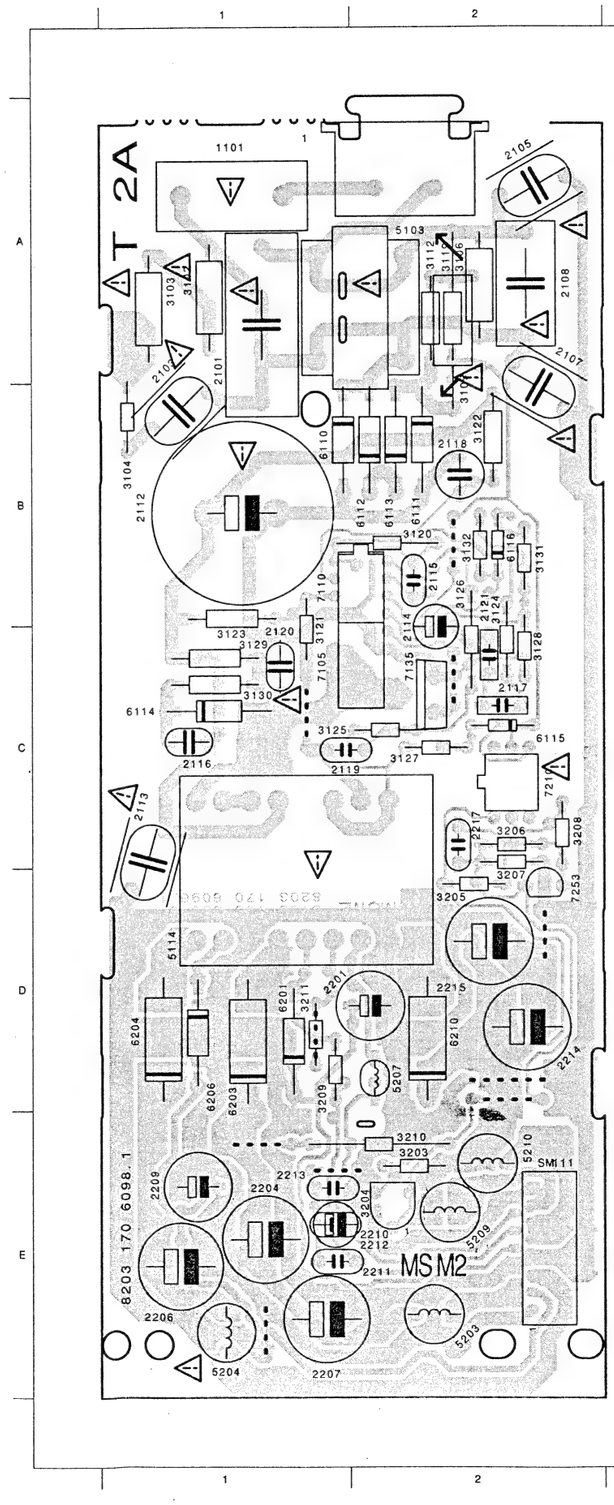
A: DC, 10V/Div, 2us/Div



Trafo 5114 Pin 4 Osc. 6

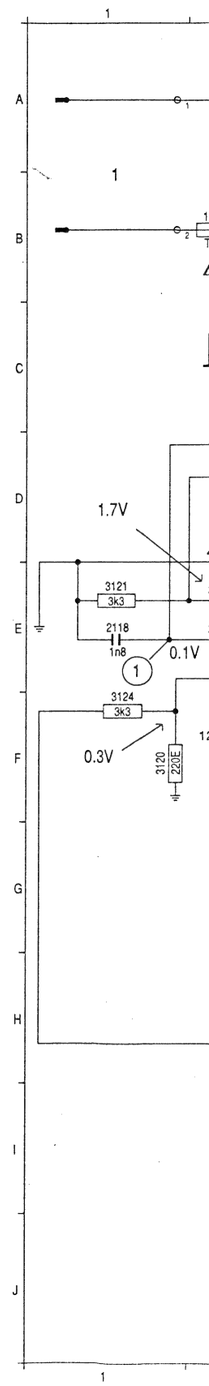
REMARKS :

POWER SUPPLY MSM1

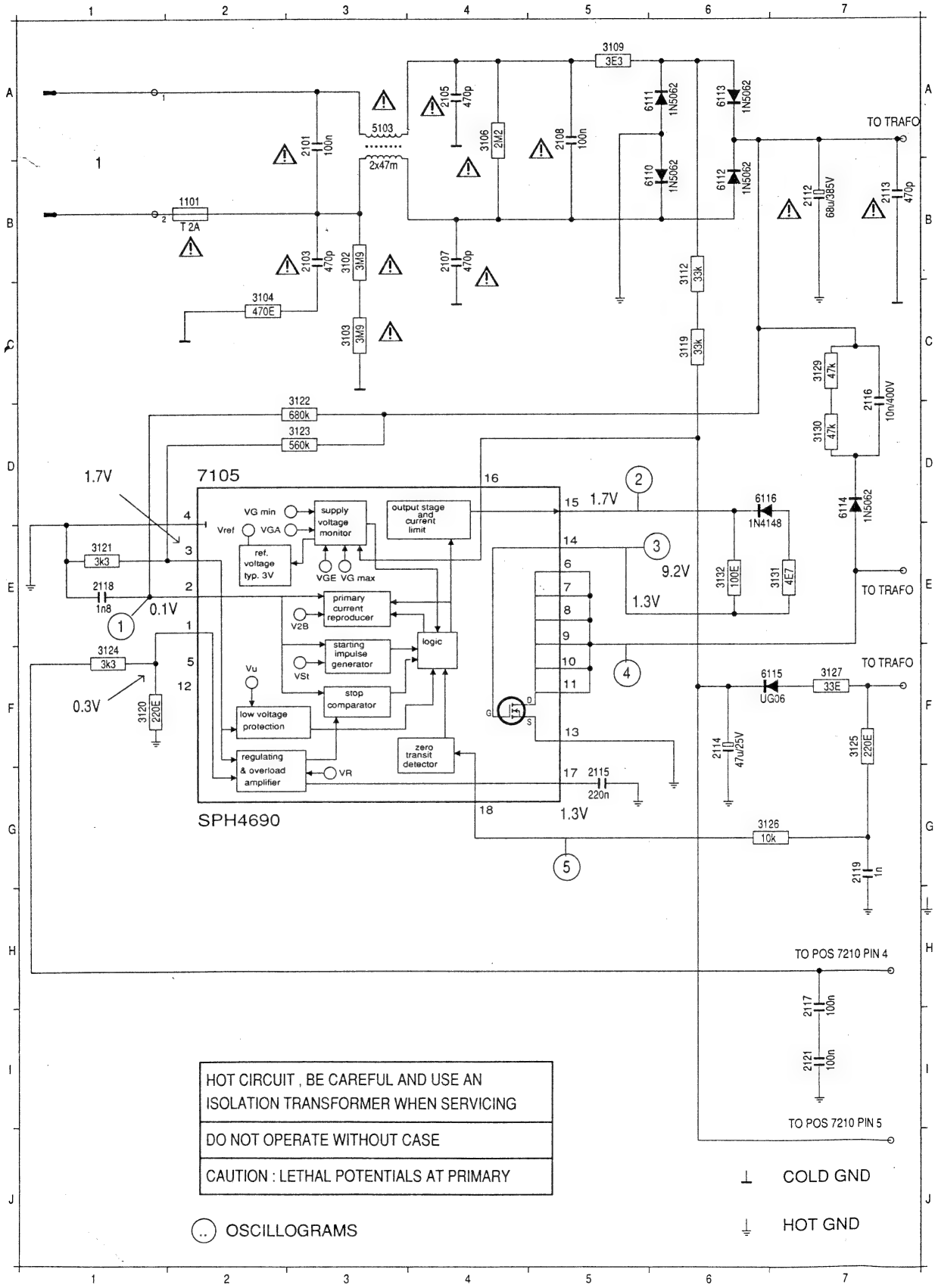


1	A 2	9006	E 1
1101	A 1	9007	D 2
2101	B 1	9008	C 1
2103	B 1	9009	C 2
2105	A 2	9010	D 1
2107	B 2	9011	E 1
2108	A 2	SM111	E 2
2112	B 1		
2113	D 1		
2114	C 2		
2115	B 2		
2116	C 1		
2117	C 2		
2118	B 2		
2119	C 1		
2120	C 1		
2121	C 2		
2201	D 2		
2204	E 1		
2206	E 1		
2207	E 1		
2209	E 1		
2210	E 1		
2211	E 1		
2212	E 1		
2213	E 1		
2214	D 2		
2215	D 2		
2217	C 2		
3102	A 1		
3103	A 1		
3104	B 1		
3106	A 2		
3109	A 2		
3112	A 2		
3119	A 2		
3120	B 2		
3121	C 1		
3122	B 2		
3123	B 1		
3124	C 2		
3125	C 2		
3126	C 2		
3127	C 2		
3128	C 2		
3129	C 1		
3130	C 1		
3131	B 2		
3132	B 2		
3203	E 2		
3204	E 2		
3205	D 2		
3206	C 2		
3207	C 2		
3208	C 2		
3209	D 1		
3210	E 2		
3211	D 1		
5103	A 1		
5114	D 1		
5203	E 2		
5204	E 1		
5207	D 2		
5209	E 2		
5210	E 2		
6110	B 1		
6111	B 2		
6112	B 2		
6113	B 2		
6114	C 1		
6115	C 2		
6116	B 2		
6201	D 1		
6203	D 1		
6204	D 1		
6206	D 1		
6210	D 2		
7105	B 1		
7110	B 2		
7135	C 2		
7210	C 2		
7253	D 2		
9001	B 2		
9003	E 1		
9004	D 2		
9005	D 2		

POWER SUPPL
(Version with SPH4



POWER SUPPLY MSM
(Version with SPH4690 IC7105, primary part)

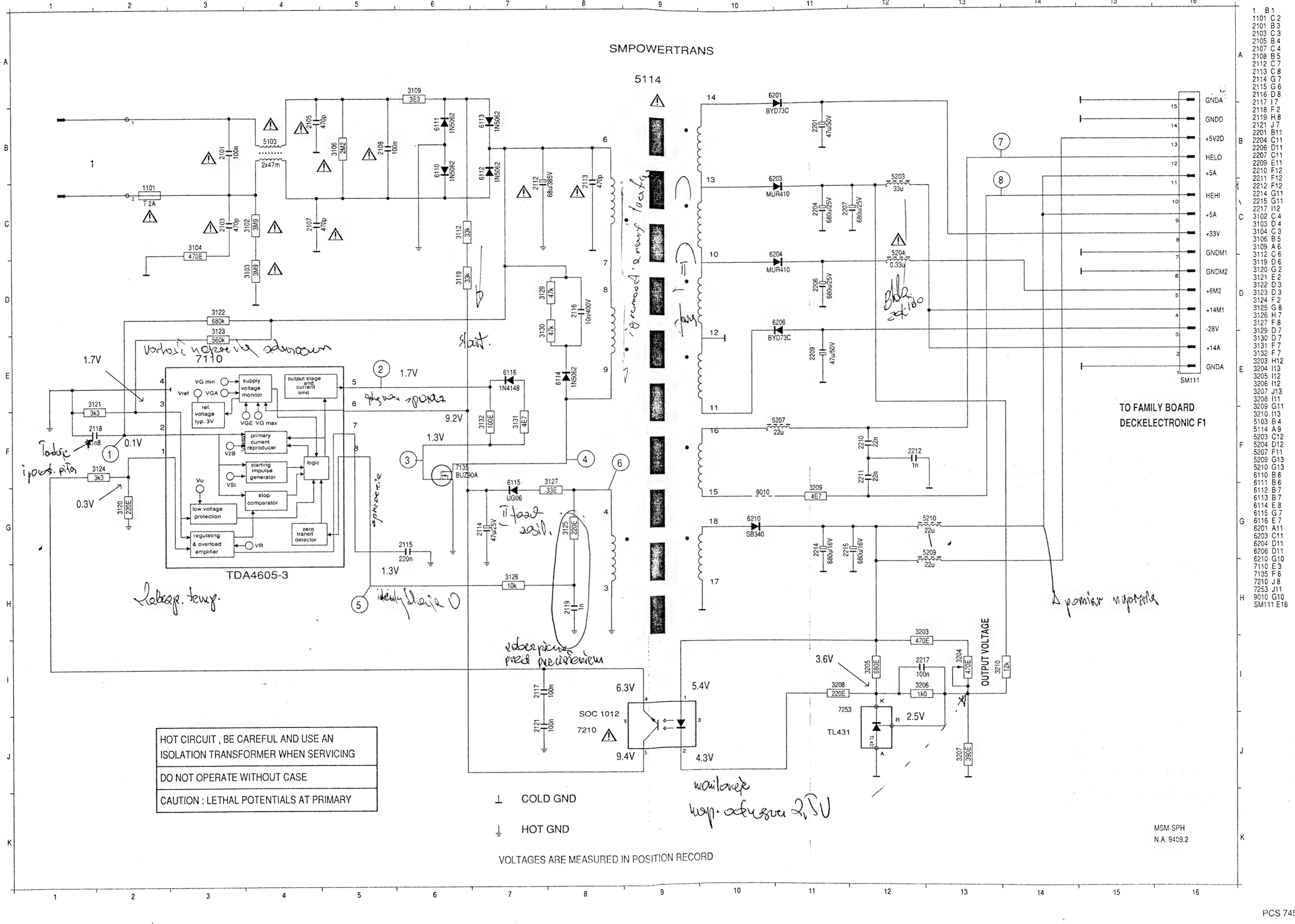


Dioda 6130

3-11

POWER SUPPLY MSM

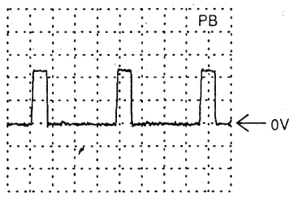
(Version with TDA4605 IC7110)



POWER SUPPLY NSM1

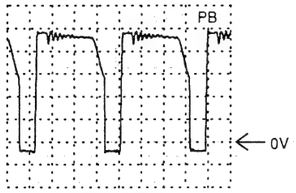
AC, 200mV/Div, 2us/Div
IC 7005/7007 Pin 2

(1)



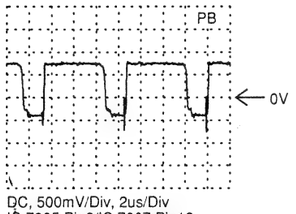
DC, 5 V/Div, 2us/Div
IC 7005 Pin 5/IC 7007 Pin 14,15

(2)



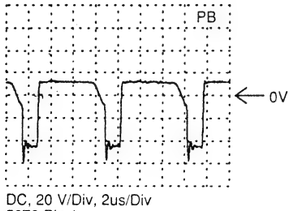
AC, 100 V/Div, 2us/Div
T 7035 DRAIN/IC 7007 Pin 6-11

(4)



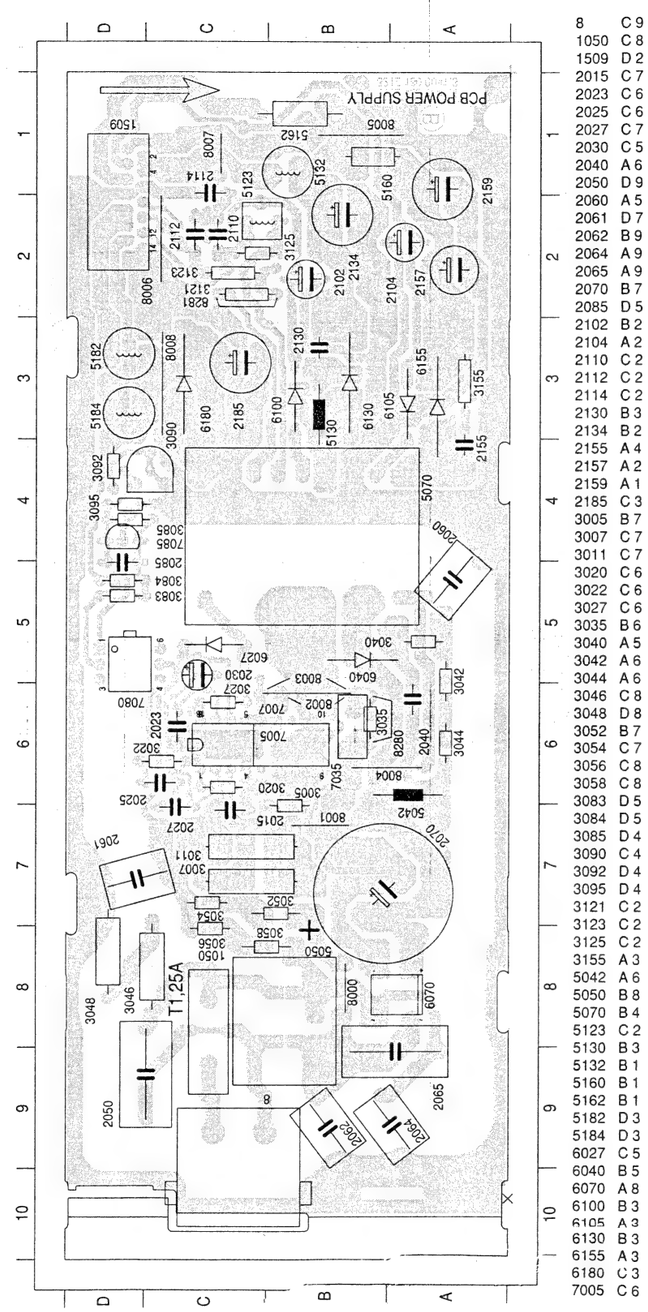
DC, 500mV/Div, 2us/Div
IC 7005 Pin8/IC 7007 Pin18

(5)



DC, 20 V/Div, 2us/Div
5070 Pin 1

(6)



8	C 9	7007	C 6
1050	C 8	7035	B 6
1509	D 2	7080	D 5
2015	C 7	7085	D 4
2023	C 6	8000	B 8
2025	C 6	8001	B 7
2027	C 7	8002	B 6
2030	C 5	8003	B 6
2040	A 6	8004	B 6
2050	D 9	8005	B 1
2060	A 5	8006	C 2
2061	D 7	8007	C 1
2062	B 9	8008	C 3
2064	A 9		
2065	A 9		
2070	B 7		
2085	D 5		
2102	B 2		
2104	A 2		
2110	C 2		
2112	C 2		
2114	C 2		
2130	B 3		
2134	B 2		
2155	A 4		
2157	A 2		
2159	A 1		
2185	C 3		
3005	B 7		
3007	C 7		
3011	C 7		
3020	C 6		
3022	C 6		
3027	C 6		
3035	B 6		
3040	A 5		
3042	A 6		
3044	A 6		
3046	C 8		
3048	D 8		
3052	B 7		
3054	C 7		
3056	C 8		
3058	C 8		
3083	D 5		
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3090	C 4		
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3095	D 4		
3121	C 2		
3123	C 2		
3125	C 2		
3155	A 3		
5042	A 6		
5050	B 8		
5070	B 4		
5123	C 2		
5130	B 3		
5132	B 1		
5160	B 1		
5162	B 1		
5182	D 3		
5184	D 3		
6027	C 5		
6040	B 5		
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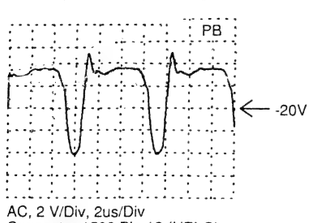
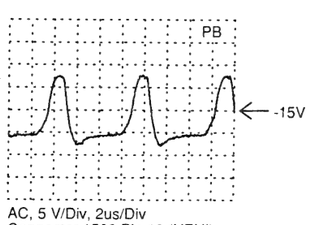
6155	A 3		
6180	C 3		
7005	C 6		



AC, 2 V/Div, 2us/Div
Connector 1509 Pin 12 (HELO)

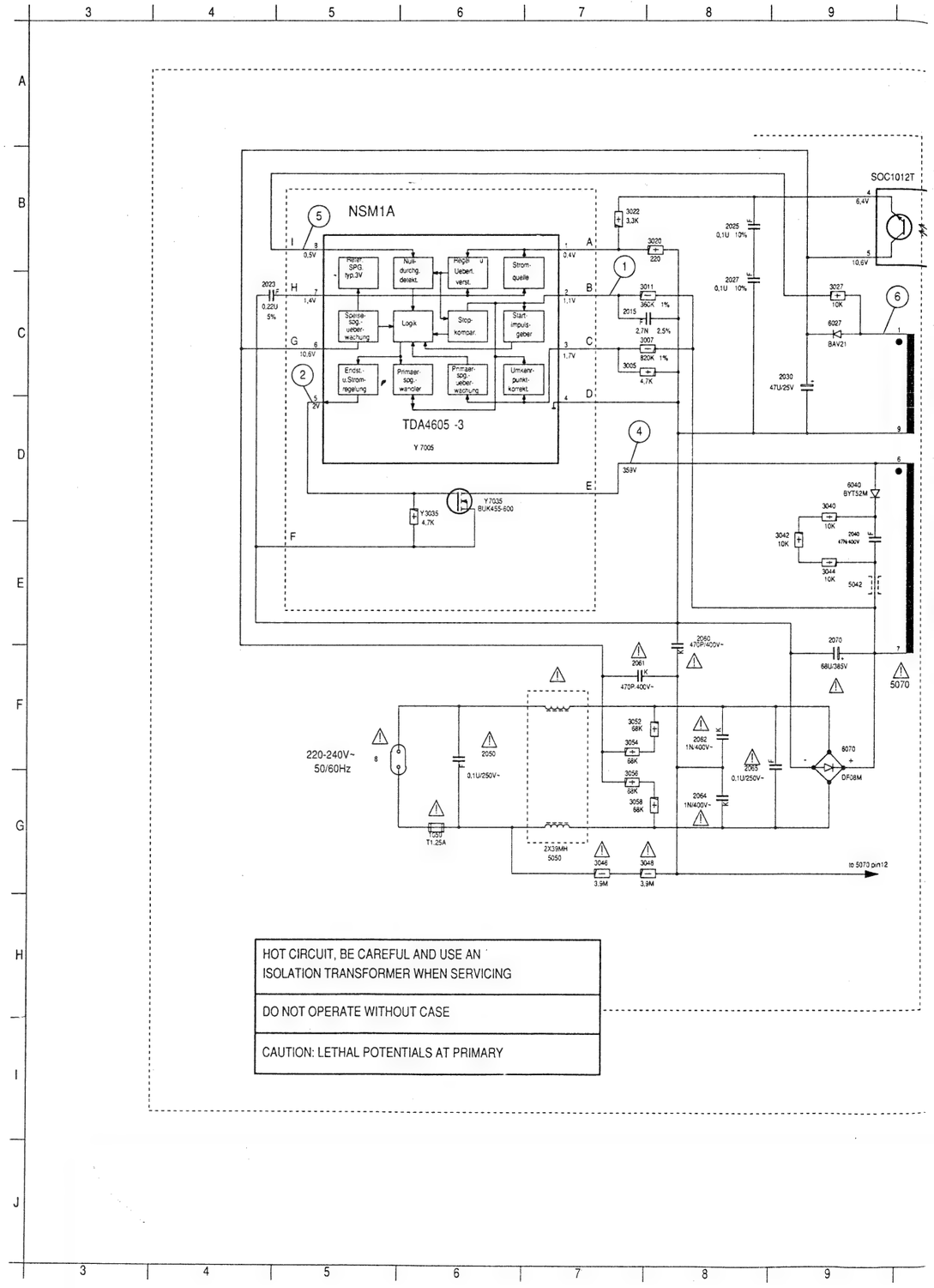
(7)



AC, 5 V/Div, 2us/Div
Connector 1509 Pin 10 (HEHI)

(8)

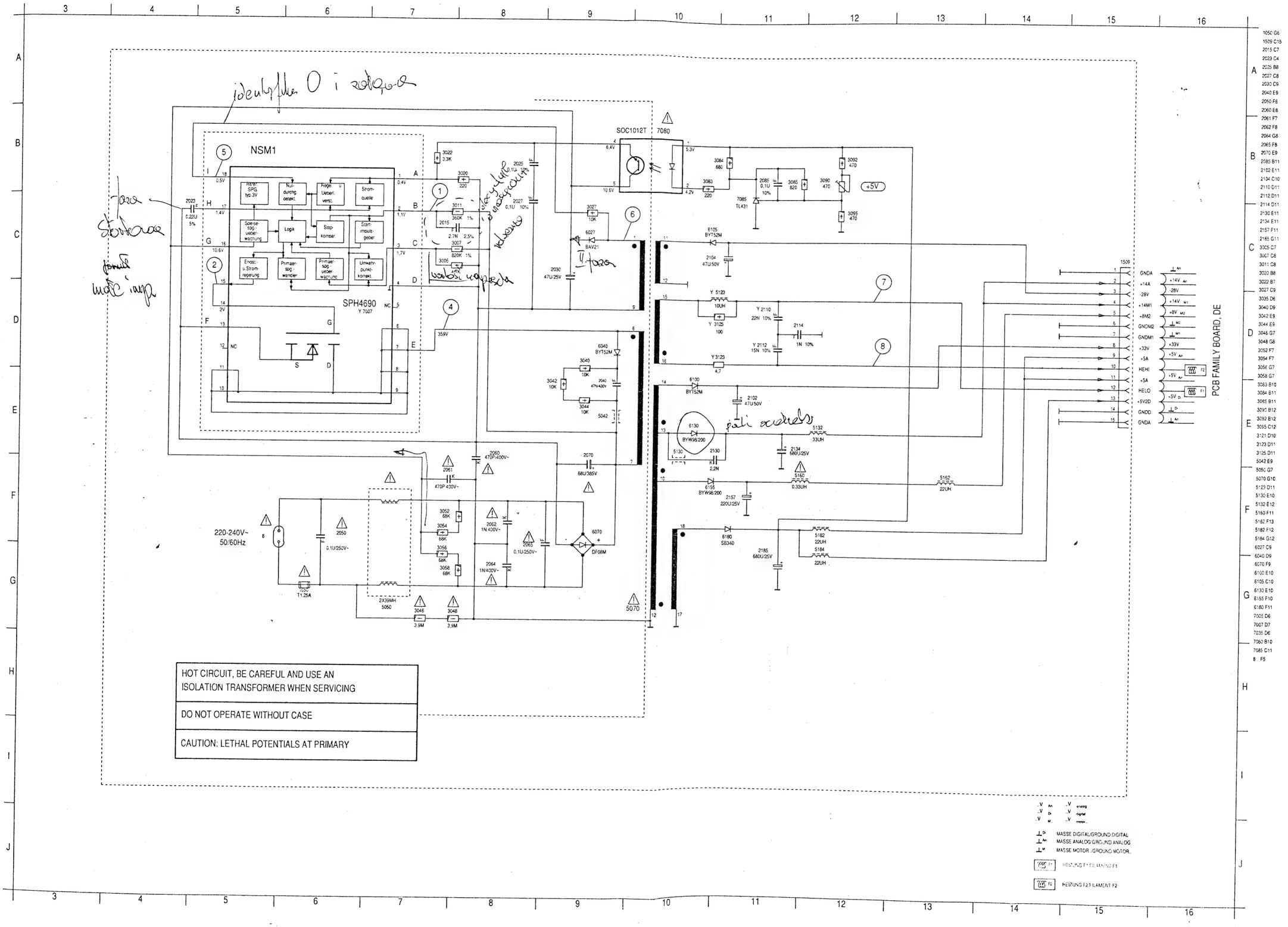
POWER SUPPLY NSM1
(Version with SPH4690 IC7005, primary part)



3-13

POWER SUPPLY NSM1

(Version with SPH4690 IC7007)

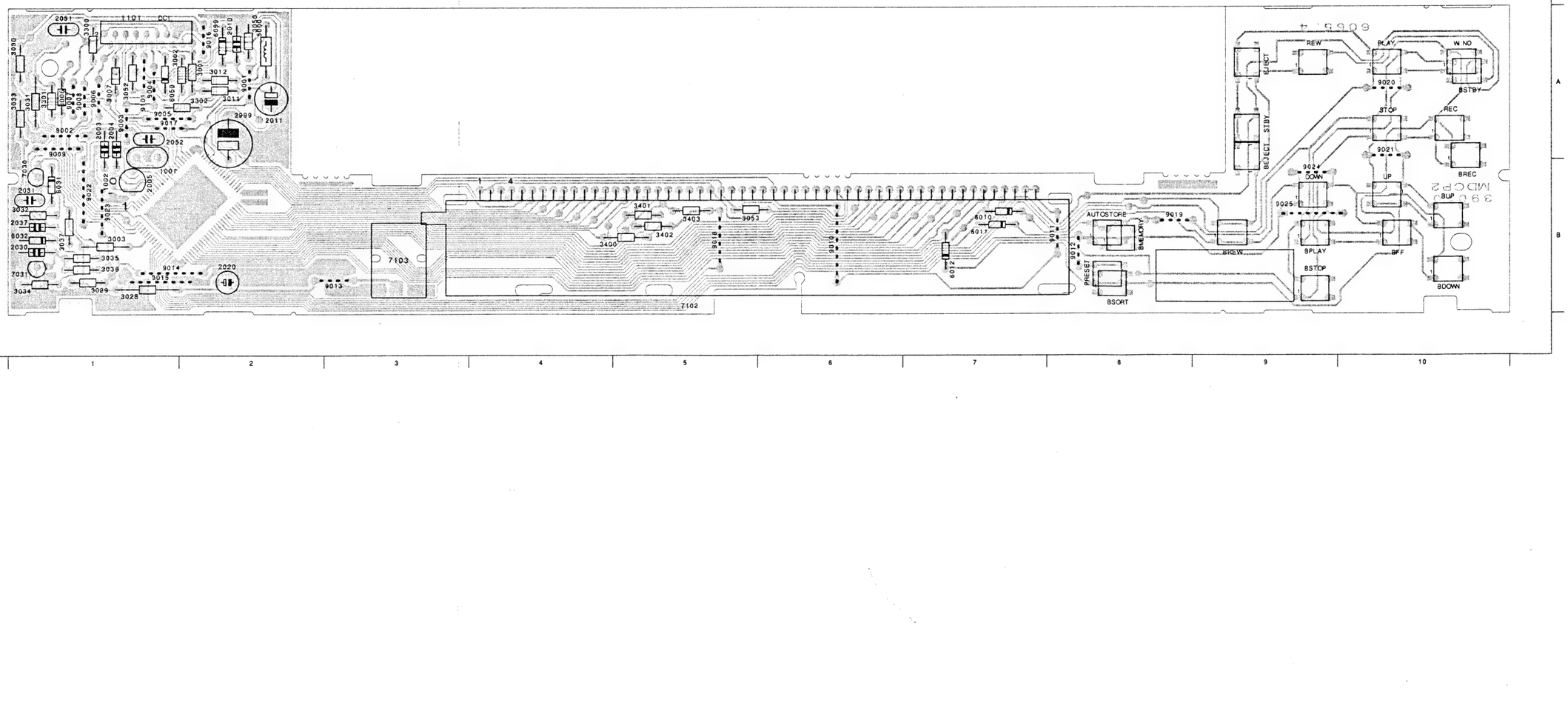


PCS 74509

PCS 74511

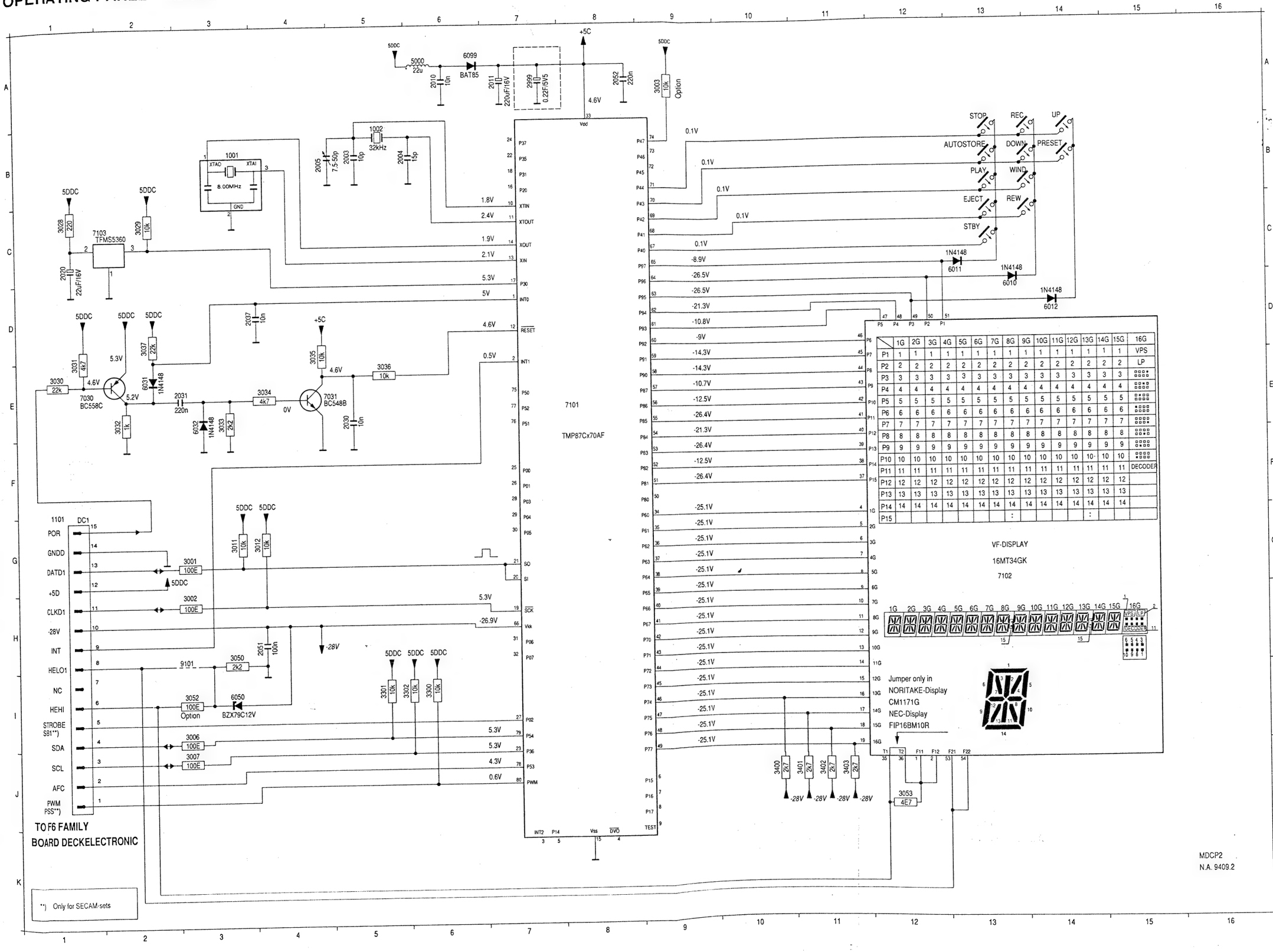
OPERATING PANEL MDCP2

1001 A 1 2005 B 1 2030 B 1 2052 A 1 3003 B 1 3012 A 2 3031 A 1 3035 B 1 3052 A 1 3302 A 2 3403 B 5 6012 B 7 6099 A 2 7103 B 3 9004 A 1 9008 A 1 9012 B 6 9016 A 2 9020 A 10 9024 B 9 barcode B 8
1002 B 1 2010 A 2 2031 B 1 2999 A 2 3006 A 1 3028 B 1 3032 B 1 3036 B 1 3053 B 5 3400 B 5 5000 A 2 6031 B 1 7030 B 1 9001 A 2 9005 A 1 9009 A 1 9013 B 3 9017 A 1 9021 A 10 9025 B 9
2003 A 1 2011 A 2 2037 B 1 3001 A 2 3007 A 1 3029 B 1 3033 A 1 3037 B 1 3300 A 1 3401 B 5 6010 B 7 6032 B 1 7031 B 1 9002 A 1 9006 A 1 9010 B 6 9014 B 1 9018 B 5 9022 B 1 9101 A 1
2004 A 1 2020 B 2 2051 A 1 3002 A 2 3011 A 2 3030 A 1 3034 B 1 3050 A 2 3301 A 1 3402 B 5 6011 B 7 6050 A 1 7102 B 5 9003 A 1 9007 A 1 9011 B 8 9015 B 1 9019 B 8 9023 B 1 DC1 A 1



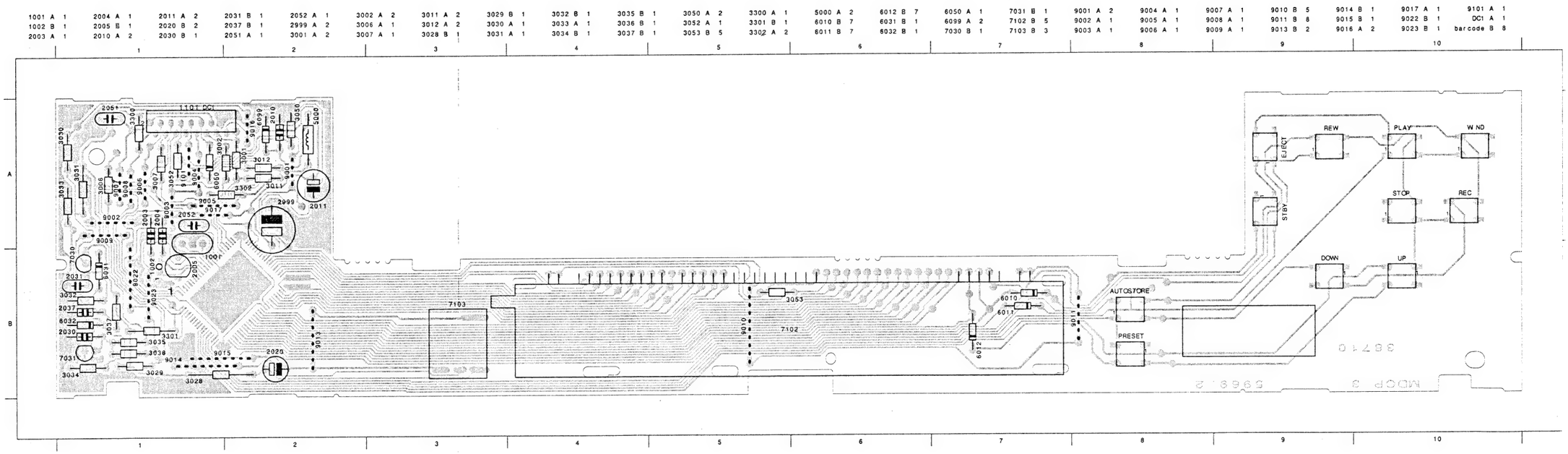
3-15

OPERATING PANEL MDCP2



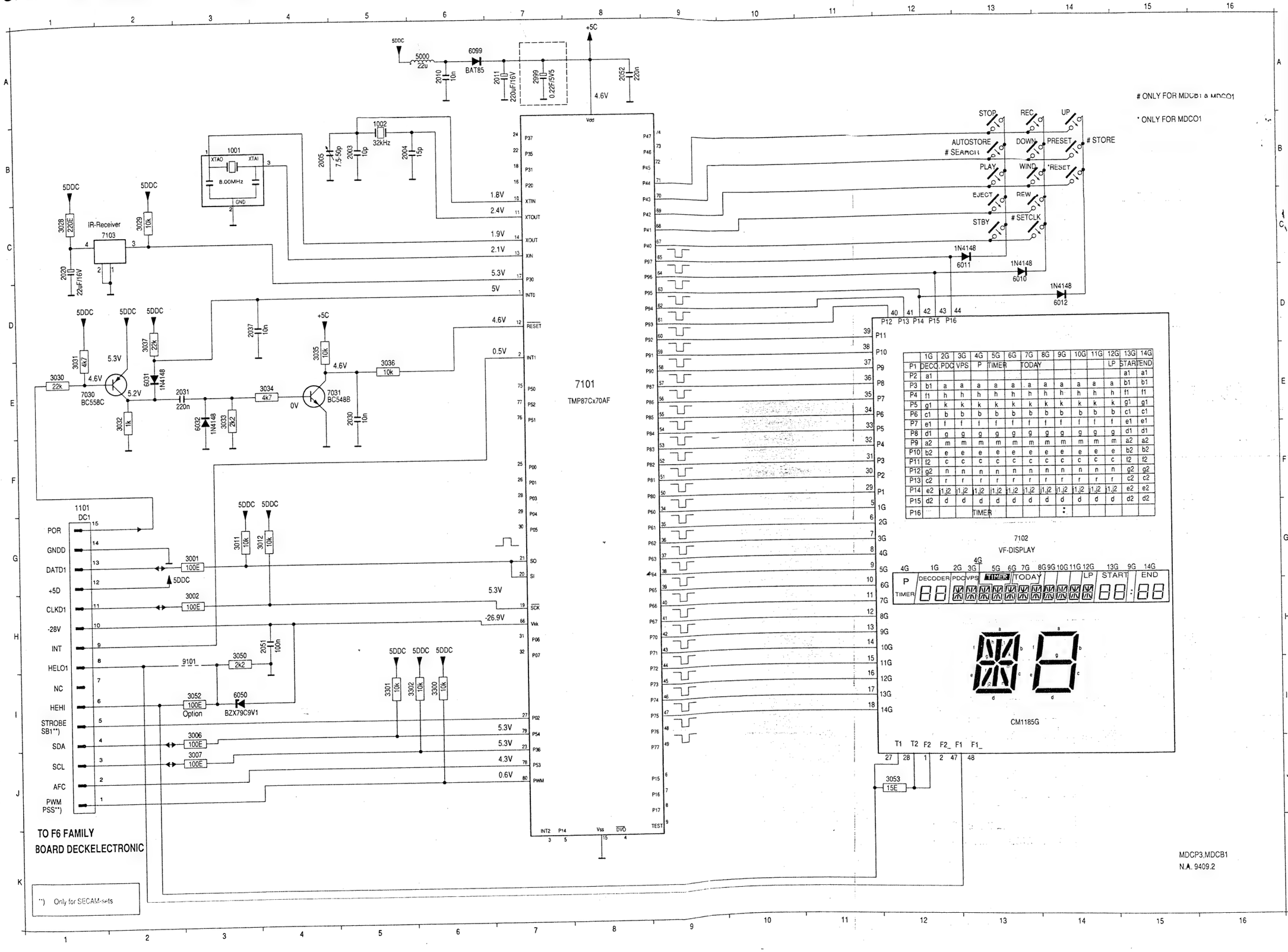
1001 B 3
1002 B 5
2003 B 5
2004 B 5
2005 B 4
2010 A 6
2011 A 7
2020 C 1
2030 E 5
2031 E 3
2037 D 3
2051 H 4
2052 A 8
2999 A 7
3001 G 3
3002 H 3
3003 A 9
3006 I 3
3007 J 3
3011 G 3
3012 G 4
3028 C 1
3029 C 2
3030 E 1
3031 E 1
3032 E 2
3033 E 3
3034 E 4
3035 D 4
3036 E 5
3037 D 2
3050 H 3
3052 I 3
3053 J12
3300 I 6
3301 I 5
3302 I 5
3400 J10
3401 J11
3402 J11
3403 J11
5000 A 6
6010 D13
6011 D13
6012 D14
6031 E 2
6032 E 3
6050 I 3
6099 A 6
7030 E 1
7031 E 4
7101 E 8
7102 G13
7103 C 1
9101 H 3
DC1 G 1
DOWN B13
EJECT C13
PLAY B13
PRESE B14
REC B13
REW C13
STBY C13
STOP B13
UP B14
WIND B13

OPERATING PANEL MDCP3, MDCB1

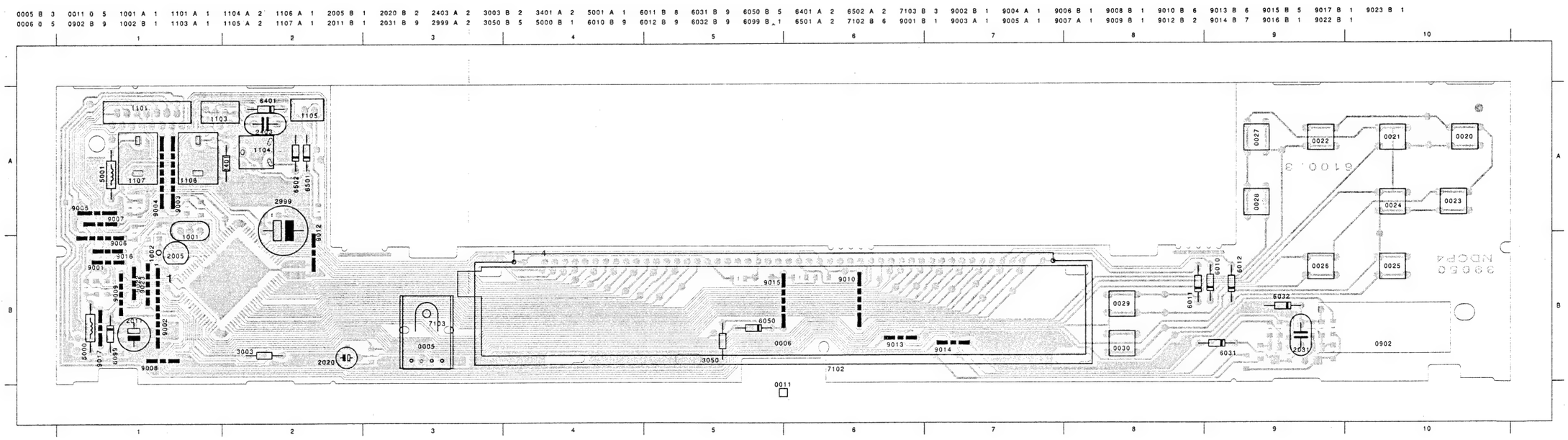


3-17

OPERATING PANEL MDCP3, MDCB1

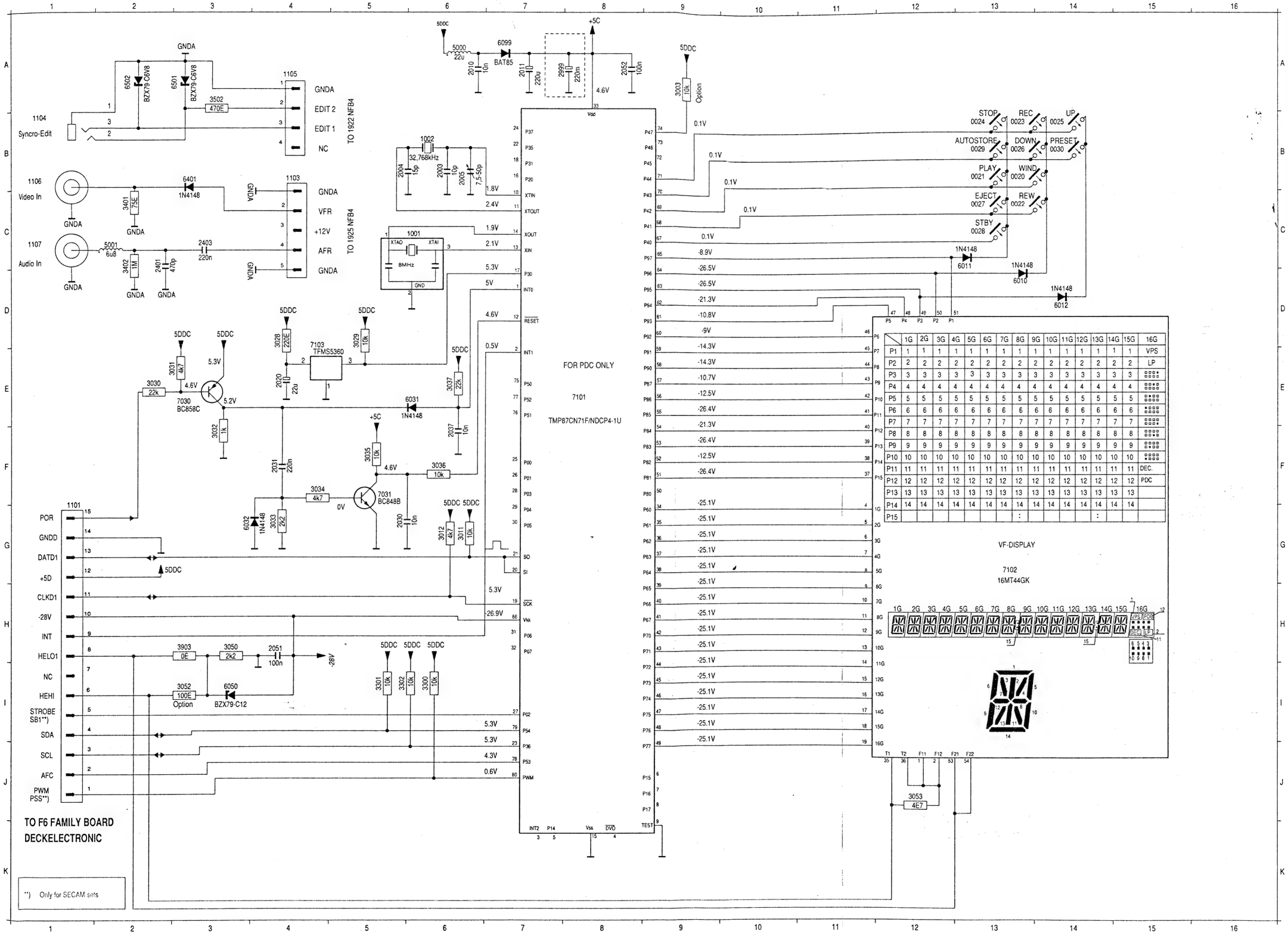


OPERATING PANEL NDCP4



3-19

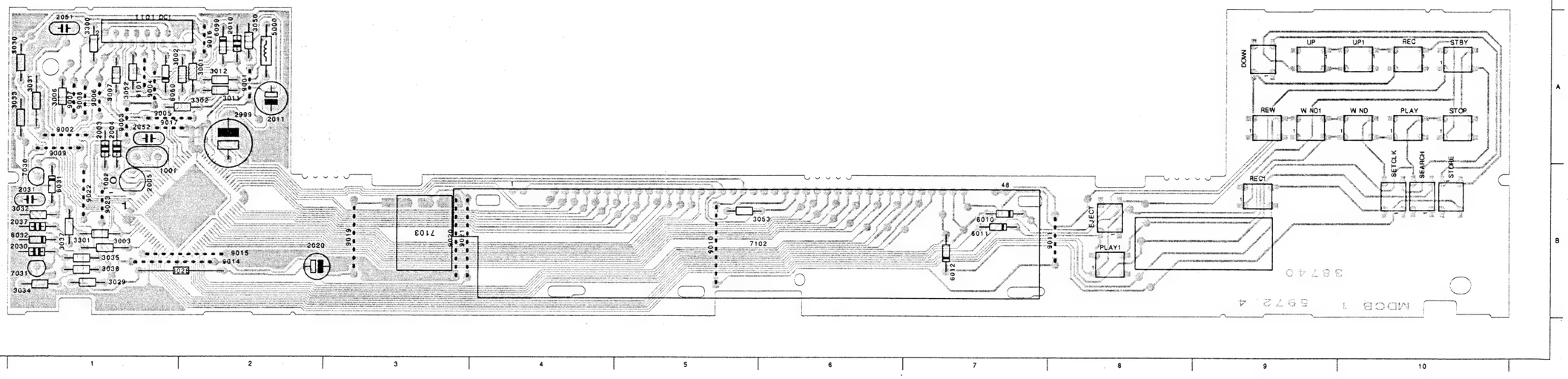
OPERATING PANEL NDCP4



	1G	2G	3G	4G	5G	6G	7G	8G	9G	10G	11G	12G	13G	14G	15G	16G
P1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	VPS
P2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	LP
P3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
P4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
P5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
P6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
P7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
P8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
P9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	
P10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
P11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	DEC.
P12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	PDC
P13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	
P14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
P15								:					:			

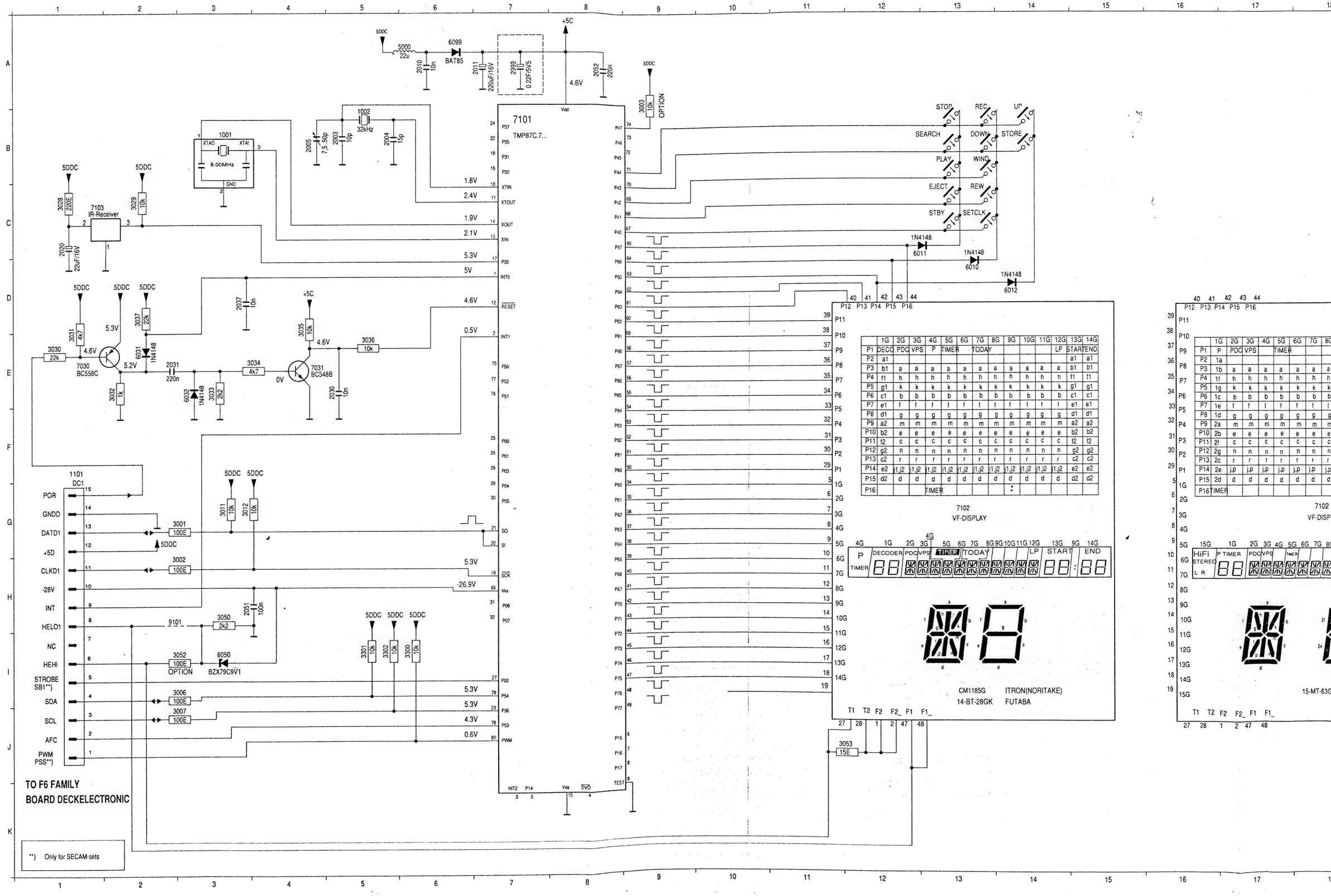
OPERATING PANEL NDCB1

1001 A 1	2005 B 1	2030 B 1	2052 A 1	3003 B 1	3012 A 2	3031 A 1	3035 B 1	3052 A 1	3302 A 2	6012 B 7	6099 A 2	7103 B 3	9004 A 1	9008 A 1	9014 B 1	9019 B 3	9023 B 1
1002 B 1	2010 A 2	2031 B 1	2999 A 2	3006 A 1	3028 B 2	3032 B 1	3036 B 1	3053 B 5	5000 A 2	6031 B 1	7030 B 1	9001 A 2	9005 A 1	9009 A 1	9015 B 2	9020 B 3	9101 A 1
2003 A 1	2011 A 2	2037 B 1	3001 A 2	3007 A 1	3029 B 1	3033 A 1	3037 B 1	3300 A 1	6010 B 7	6032 B 1	7031 B 1	9002 A 1	9006 A 1	9010 B 5	9016 A 2	9021 B 3	DC1 A 1
2004 A 1	2020 B 2	2051 A 1	3002 A 2	3011 A 2	3030 A 1	3034 B 1	3050 A 2	3301 B 1	6011 B 7	6050 A 1	7102 B 5	9003 A 1	9007 A 1	9011 B 8	9017 A 1	9022 B 1	barcode B 8

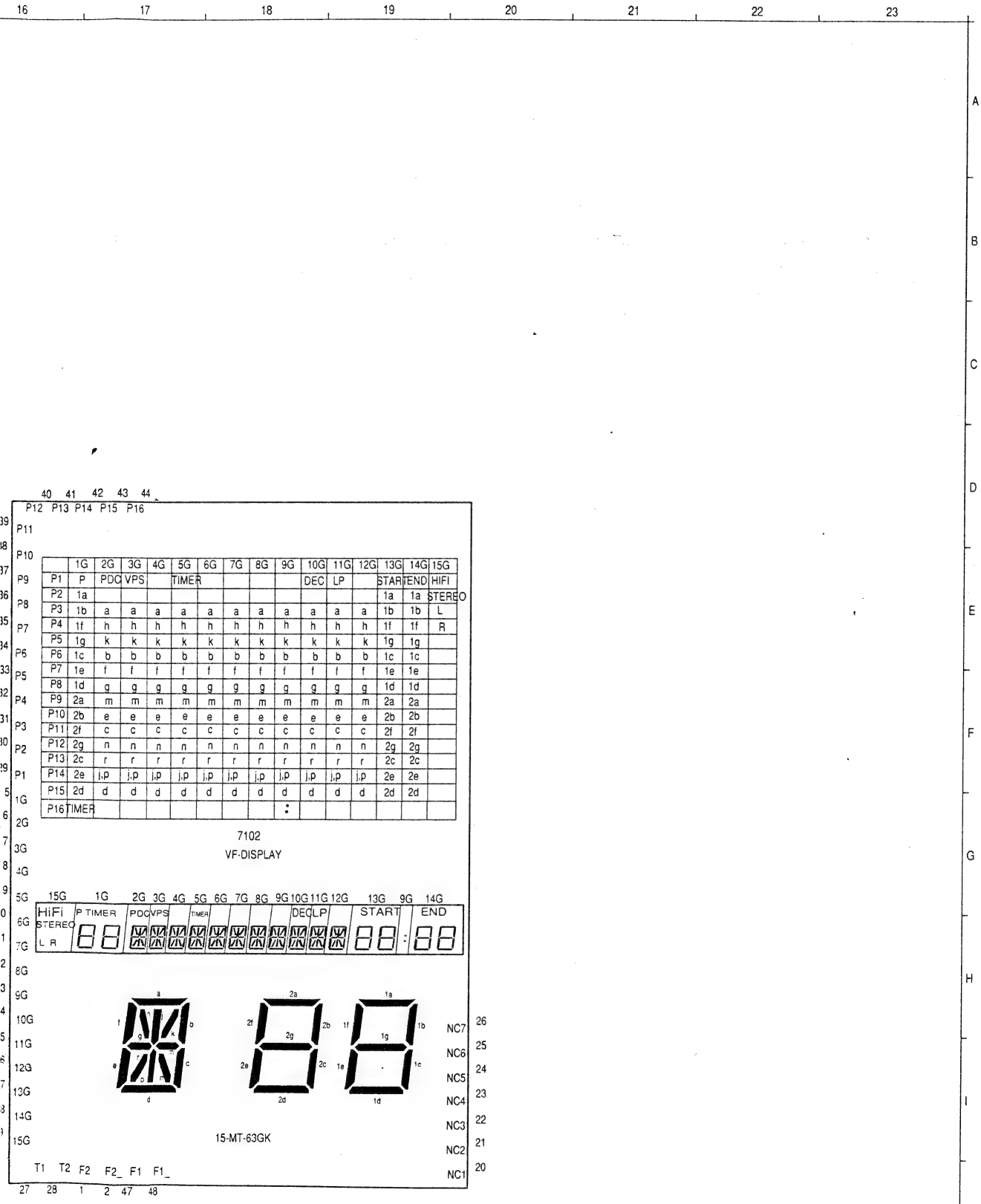


3-21

OPERATING PANEL NDCB1



74517



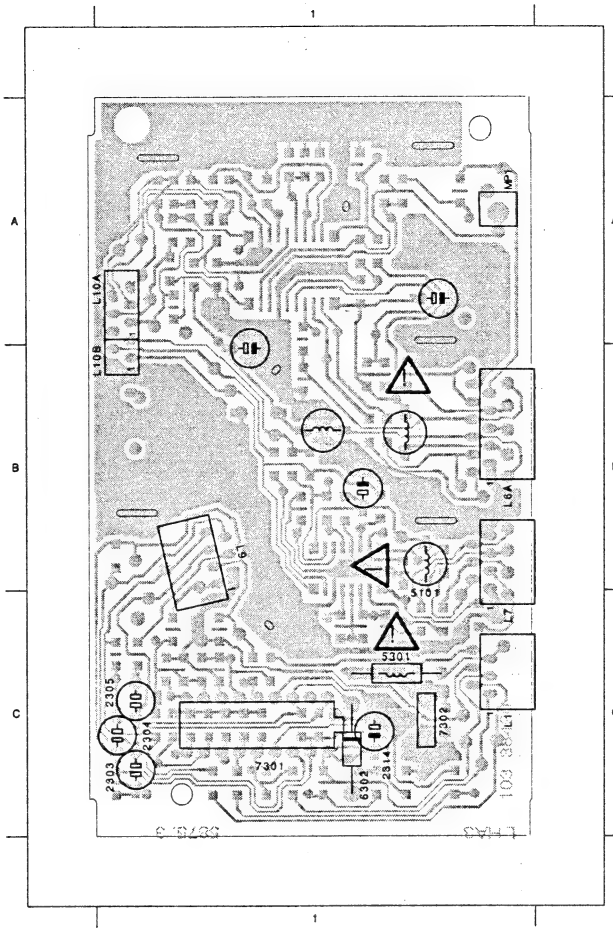
	1G	2G	3G	4G	5G	6G	7G	8G	9G	10G	11G	12G	13G	14G	15G
P1	P	PDC	VPS		TIMER					DEC	LP		STAR	END	HIFI
P2	1a												1a	1a	STEREO
P3	1b	a	a	a	a	a	a	a	a	a	a	a	1b	1b	L
P4	1f	h	h	h	h	h	h	h	h	h	h	h	1f	1f	R
P5	1g	k	k	k	k	k	k	k	k	k	k	k	1g	1g	
P6	1c	b	b	b	b	b	b	b	b	b	b	b	1c	1c	
P7	1e	f	f	f	f	f	f	f	f	f	f	f	1e	1e	
P8	1d	g	g	g	g	g	g	g	g	g	g	g	1d	1d	
P9	2a	m	m	m	m	m	m	m	m	m	m	m	2a	2a	
P10	2b	e	e	e	e	e	e	e	e	e	e	e	2b	2b	
P11	2f	c	c	c	c	c	c	c	c	c	c	c	2f	2f	
P12	2g	n	n	n	n	n	n	n	n	n	n	n	2g	2g	
P13	2c	r	r	r	r	r	r	r	r	r	r	r	2c	2c	
P14	2e	j,p	j,p	j,p	j,p	j,p	j,p	j,p	j,p	j,p	j,p	j,p	2e	2e	
P15	2d	d	d	d	d	d	d	d	d	d	d	d	2d	2d	
P16	TIMER								:						

7102
VF-DISPLAY

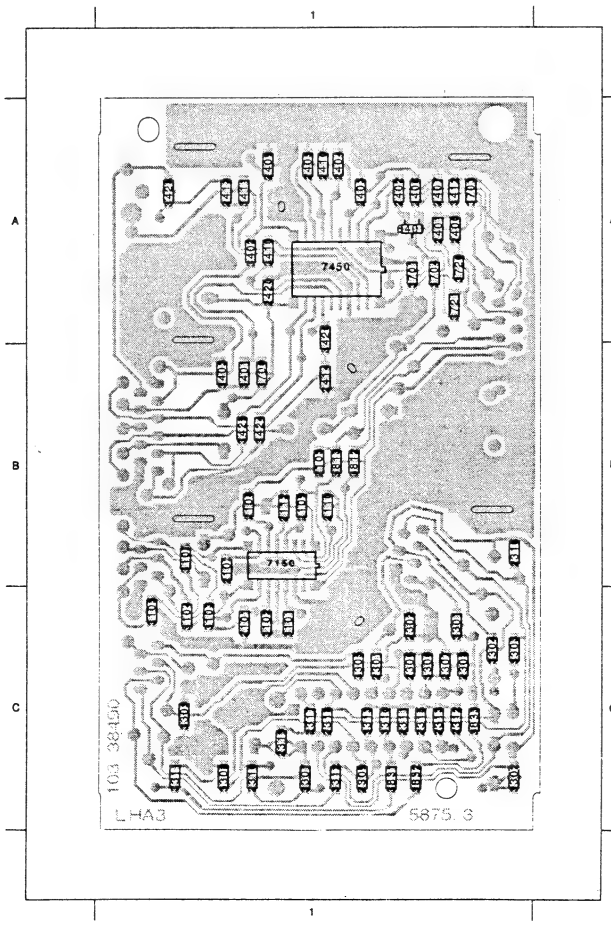
NDCB1
N.A. 9409.2

1001 B 3
1002 B 5
2003 B 5
2004 B 5
2005 B 4
2010 A 6
2011 A 7
2020 C 1
2030 E 5
2031 E 2
2037 D 3
2051 H 3
2052 A 8
2999 A 7
3001 G 3
3002 H 3
3003 A 9
3006 I 3
3007 J 3
3011 G 3
3012 G 3
3028 C 1
3029 C 2
3030 E 1
3031 E 1
3032 E 2
3033 E 3
3034 E 4
3035 D 4
3036 E 5
3037 D 2
3050 H 3
3052 I 3
3053 J12
3300 I 6
3301 I 5
3302 I 5
5000 A 6
6010 D13
6011 D13
6012 D14
6031 E 2
6032 E 3
6050 I 3
6099 A 6
7030 E 1
7031 E 4
7101 B 7
7102 G13
7103 C 1
9101 H 2
DC1 G 1
DOWN B13
EJECT C13
PLAY B13
REC B13
REW C13
SEARC B13
SETCL C13
STBY C13
STOP B13
STORE B14
UP B14
WIND B13

HEAD AMPLIFIER LHA4/0

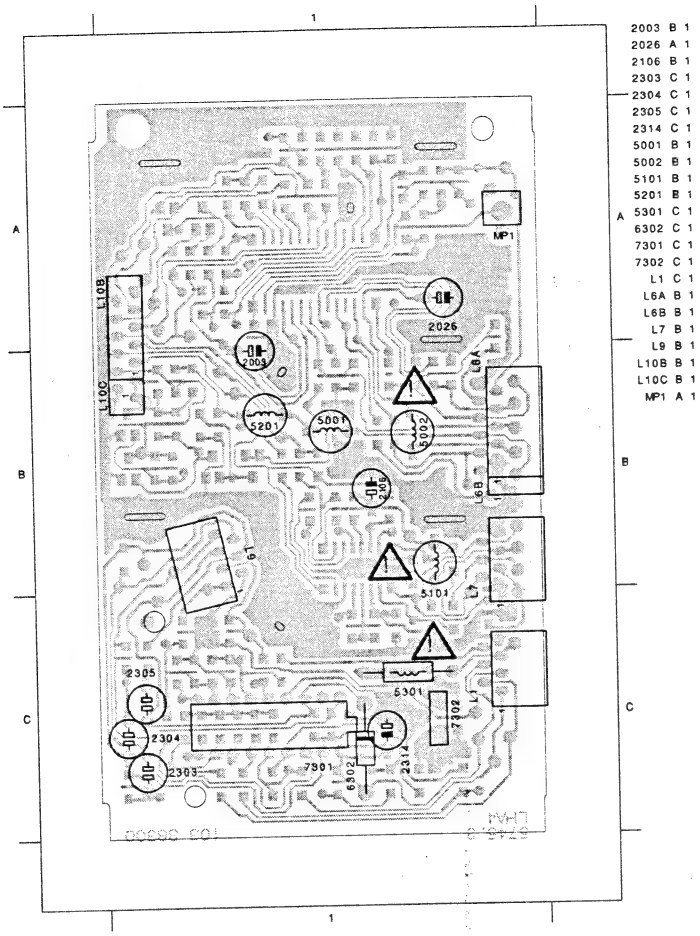


2106 B 1
2303 C 1
2304 C 1
2305 C 1
2314 C 1
2408 A 1
2411 B 1
5101 B 1
5301 C 1
5401 B 1
5402 B 1
6302 C 1
7301 C 1
7302 C 1
L1 C 1
L6A B 1
L7 B 1
L9 B 1
L10A A 1
L10B B 1
MP1 A 1

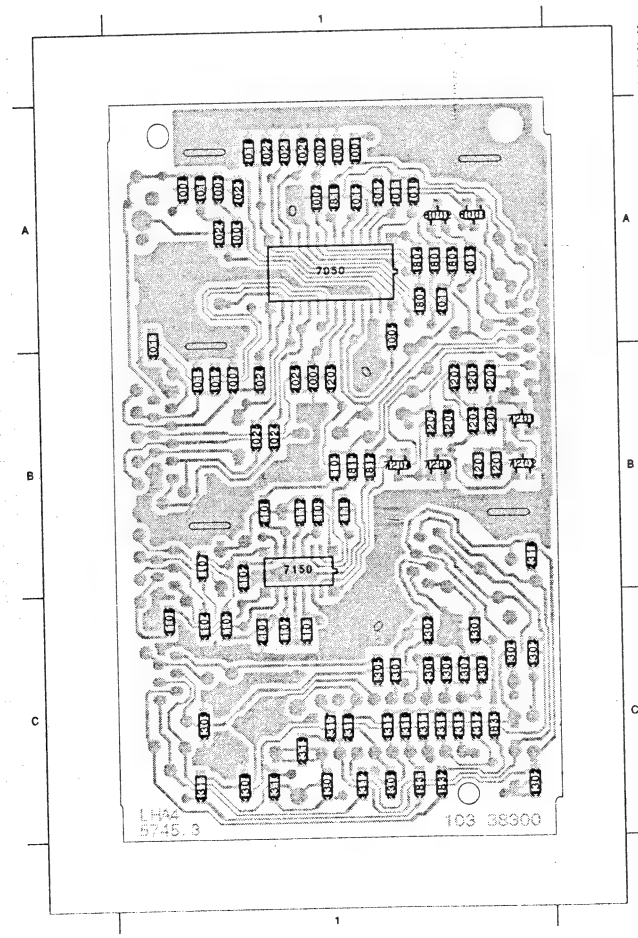


2101 C 1
2102 B 1
2103 B 1
2108 B 1
2109 B 1
2110 B 1
2112 B 1
2301 C 1
2302 C 1
2306 C 1
2307 C 1
2308 C 1
2309 C 1
2310 C 1
2311 C 1
2312 C 1
2313 C 1
2315 C 1
2316 B 1
2317 C 1
2318 C 1
2319 C 1
2400 A 1
2401 A 1
2402 A 1
2403 A 1
2404 A 1
2405 A 1
2406 A 1
2407 A 1
2409 A 1
2410 A 1
2413 A 1
2414 B 1
2420 A 1
3101 C 1
3102 C 1
3103 C 1
3104 C 1
3105 C 1
3107 B 1
3301 C 1
3302 C 1
3303 C 1
3304 C 1
3305 C 1
3306 C 1
3307 C 1
3308 C 1
3309 C 1
3310 C 1
3311 C 1
3312 C 1
3313 C 1
3401 B 1
3402 A 1
3403 B 1
3410 A 1
3411 A 1
3412 A 1
3424 B 1
3425 B 1
3426 A 1
3428 A 1
3700 B 1
3701 A 1
3703 A 1
3704 A 1
3720 A 1
3721 A 1
3812 B 1
3813 B 1
3831 C 1
3832 C 1
3833 C 1
6401 A 1
7150 B 1
7450 A 1

HEAD AMPLIFIER LHA2/0, 3/0



2003 B 1
2026 A 1
2106 B 1
2303 C 1
2304 C 1
2305 C 1
2314 C 1
5001 B 1
5002 B 1
5101 B 1
5201 B 1
5301 C 1
6302 C 1
7301 C 1
7302 C 1
L1 C 1
L6A B 1
L6B B 1
L7 B 1
L9 B 1
L10B B 1
L10C B 1
MP1 A 1



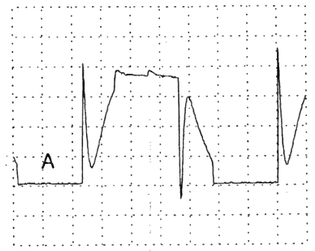
2001 A 1
2002 A 1
2004 B 1
2007 B 1
2010 A 1
2011 A 1
2012 A 1
2013 A 1
2015 A 1
2017 A 1
2018 A 1
2020 A 1
2021 A 1
2022 A 1
2023 A 1
2024 A 1
2025 B 1
2101 C 1
2102 B 1
2103 B 1
2108 B 1
2109 B 1
2110 B 1
2112 B 1
2201 B 1
2202 B 1
2203 B 1
2204 B 1
2301 C 1
2302 C 1
2306 C 1
2307 C 1
2308 C 1
2309 C 1
2310 C 1
2311 C 1
2312 C 1
2313 C 1
2315 C 1
2316 B 1
2317 C 1
2318 C 1
2319 C 1
3001 A 1
3002 A 1
3003 A 1
3004 A 1
3005 A 1
3008 A 1
3010 A 1
3011 A 1
3012 B 1
3015 B 1
3024 B 1
3025 B 1
3026 B 1
3101 C 1
3102 C 1
3103 C 1
3104 C 1
3105 C 1
3107 B 1
3201 B 1
3202 B 1
3203 B 1
3204 B 1
3205 B 1
3206 B 1
3301 C 1
3302 C 1
3303 C 1
3304 C 1
3305 C 1
3306 C 1
3307 C 1
3308 C 1
3309 C 1
3310 C 1
3311 C 1
3312 C 1
3313 C 1
3801 A 1
3803 A 1
3804 A 1
3805 A 1
3810 A 1
3812 B 1
3813 B 1
3831 C 1
3832 C 1
3833 C 1
6001 A 1
6002 A 1
7050 A 1
7150 B 1
7201 B 1
7202 B 1
7203 B 1
7204 B 1

HEAD AMPLIFIER LHA2/0, 3/0 (for Standard play)

A: DC, 1 V/Div, 0.5 ms/Div

Osc. 55
Connector L9,4

A: DC, 2 V/Div, 1 ms/Div

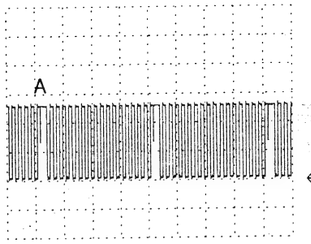


Osc. 56
IC 7301 Pin 1,16,3

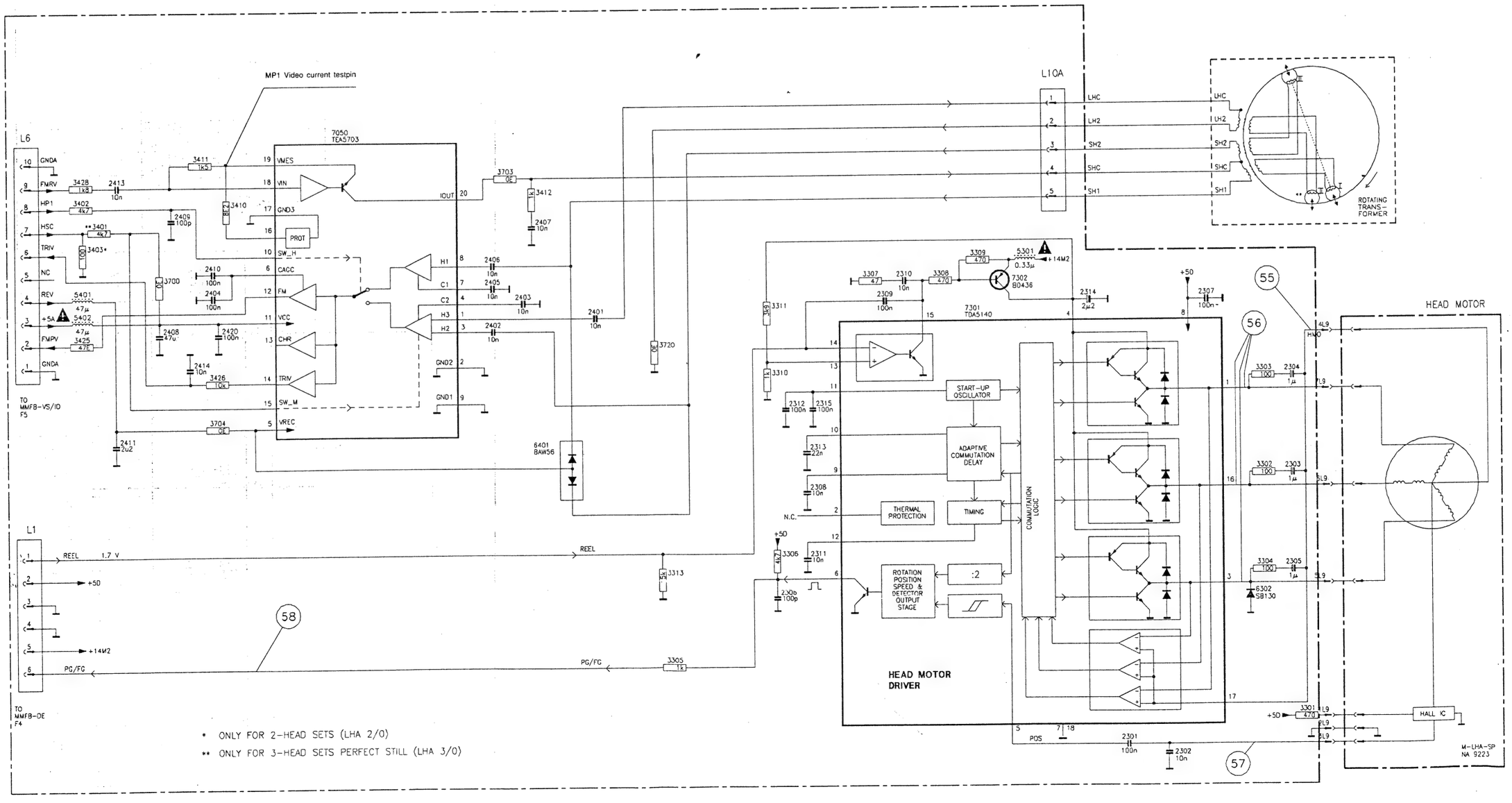
A: DC, 0.2 V/Div, 10 ms/Div

Osc. 57
Connector L9,3

A: DC, 2 V/Div, 10 ms/Div



Osc. 58
Connector L1,6 PG/FG

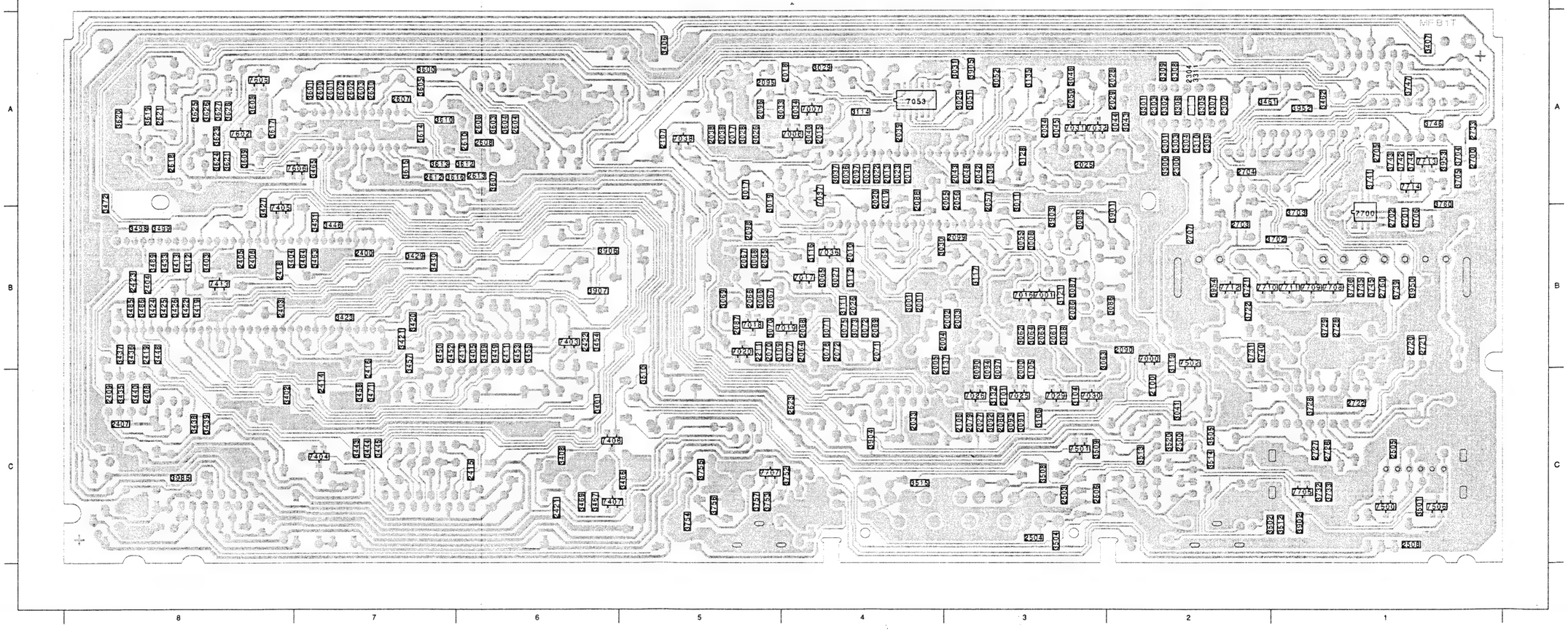


FAMILY BOARD N1 N2

"INSERTED COMPONENTS ARE DEPENDENT ON THE SET TYPE"

2000 C 3 2025 A 3 2056 A 3 2080 C 3 2211 B 5 2409 C 8 2505 C 1 2618 A 8 2726 C 1 3026 A 5 3044 A 2 3070 B 5 3093 C 3 3128 A 3 3309 A 2 3419 B 8 3436 B 8 3454 B 6 3485 B 8 3514 C 2 3613 A 7 3702 B 1 3739 B 1 3757 C 5 7000 B 2 7032 A 3 7506 C 1
2001 B 4 2026 B 4 2057 A 3 2086 B 3 2300 A 2 2411 B 6 2506 C 3 2621 A 8 2727 C 1 3027 B 4 3045 A 3 3071 B 4 3094 C 3 3132 C 3 3310 A 2 3420 B 7 3437 B 8 3455 B 6 3486 B 8 3515 C 4 3614 A 7 3703 B 1 3740 B 2 3760 A 1 7001 B 3 7036 B 4 7602 A 8
2002 B 3 2027 C 3 2061 B 3 2087 B 5 2301 A 2 2413 B 6 2508 C 1 2623 C 4 2728 B 1 3028 A 5 3046 A 3 3072 B 4 3097 C 3 3135 A 3 3311 A 2 3421 B 7 3438 C 8 3457 B 7 3489 B 8 3520 C 2 3615 A 7 3704 A 1 3741 A 1 3901 B 2 7006 A 4 7037 A 4 7605 A 8
2003 B 3 2028 A 2 2063 B 3 2088 A 4 2302 A 2 2414 C 7 2600 A 7 2630 A 7 2733 A 1 3029 A 4 3051 A 3 3073 B 4 3104 C 3 3136 A 3 3401 C 6 3422 B 8 3439 C 8 3458 C 7 3498 B 8 3600 A 7 3616 A 7 3705 A 1 3742 A 1 3902 C 1 7007 A 4 7038 A 5 7606 A 7
2004 B 4 2029 A 2 2064 B 4 2090 B 2 2303 A 2 2415 C 6 2601 A 7 2700 A 1 2760 B 1 3030 B 4 3052 A 3 3075 B 4 3105 C 3 3137 B 3 3402 C 8 3423 B 7 3440 C 8 3461 A 2 3499 B 8 3601 A 7 3617 A 8 3706 B 1 3743 A 1 3903 B 3 7016 B 3 7053 A 4 7700 B 1
2005 B 4 2033 C 4 2065 B 5 2095 A 5 2304 A 2 2416 C 7 2602 A 7 2701 B 1 3001 B 4 3031 A 3 3055 B 3 3077 B 4 3106 C 3 3300 A 2 3403 B 8 3424 B 8 3443 C 7 3462 A 1 3501 C 1 3602 A 7 3619 A 8 3721 B 2 3744 A 1 3904 C 4 7017 B 4 7403 B 6 7705 C 1
2010 B 4 2034 A 3 2066 B 5 2096 A 5 2305 A 2 2418 B 8 2603 A 7 2702 B 1 3008 B 3 3033 A 5 3062 B 3 3078 B 4 3109 B 5 3301 A 2 3404 B 8 3425 B 8 3444 C 7 3463 B 7 3502 C 2 3603 A 6 3620 A 8 3722 B 2 3745 B 1 3905 A 3 7018 B 5 7404 C 7 7707 C 5
2013 A 4 2038 A 5 2067 B 5 2097 A 4 2400 B 7 2419 B 8 2604 A 6 2703 B 2 3011 A 3 3034 A 4 3063 B 3 3085 B 3 3111 B 4 3302 A 2 3405 B 6 3426 B 8 3445 C 7 3464 B 7 3504 C 3 3604 A 6 3621 A 8 3728 C 1 3746 A 1 3906 B 6 7019 B 4 7405 B 8 7708 B 1
2014 A 4 2039 A 4 2068 B 4 2098 B 5 2403 B 8 2421 C 6 2606 A 6 2704 A 2 3017 A 5 3036 A 4 3064 B 3 3086 B 2 3112 B 4 3303 A 2 3406 A 5 3427 B 8 3446 B 7 3465 A 7 3505 C 2 3605 A 7 3623 A 8 3729 B 1 3747 A 1 3907 B 6 7020 B 5 7406 C 6 7709 B 1
2015 A 4 2042 A 3 2069 B 4 2099 B 3 2404 B 8 2422 B 6 2607 A 7 2705 A 1 3019 A 5 3037 A 4 3065 B 4 3087 B 3 3114 A 4 3304 A 2 3407 A 1 3429 B 7 3448 B 8 3466 C 5 3508 C 3 3607 A 6 3624 A 8 3731 B 2 3752 C 4 3950 B 1 7025 C 3 7407 C 6 7710 B 2
2017 A 5 2043 A 3 2070 B 5 2100 C 2 2405 B 8 2423 B 8 2608 A 6 2707 B 2 3021 A 4 3038 A 5 3066 B 5 3088 B 3 3116 B 4 3305 A 2 3408 C 6 3430 B 7 3449 B 6 3467 C 6 3509 C 3 3608 A 8 3625 A 8 3732 C 1 3753 C 5 3952 A 1 7026 C 3 7413 B 8 7711 B 1
2018 A 4 2048 A 3 2071 B 4 2101 C 3 2406 B 8 2500 C 2 2610 A 6 2720 B 1 3022 A 4 3040 A 4 3067 B 5 3090 C 3 3117 B 3 3306 A 2 3409 B 6 3431 B 7 3450 B 7 3469 C 6 3510 C 5 3609 A 8 3626 A 8 3733 C 1 3754 C 5 3953 A 1 7029 C 3 7500 C 1 7712 B 2
2019 A 4 2050 A 3 2072 B 4 2106 C 3 2407 C 8 2503 C 3 2612 A 7 2721 B 1 3023 A 4 3041 C 2 3068 B 5 3091 C 3 3119 B 2 3307 A 2 3412 B 8 3433 B 8 3452 B 7 3471 C 7 3512 C 1 3610 A 7 3627 A 8 3735 B 1 3755 C 5 3954 B 2 7030 C 3 7501 C 3 7713 A 1
2020 A 4 2055 A 3 2079 C 3 2107 A 5 2408 C 8 2504 C 3 2613 A 6 2722 C 1 3025 A 3 3043 A 2 3069 B 5 3092 C 3 3121 B 3 3308 A 2 3413 B 8 3435 C 8 3453 B 6 3472 A 8 3513 C 2 3612 A 6 3628 A 8 3736 B 1 3756 C 5 3985 C 8 7031 A 3 7502 B 2 7714 A 1

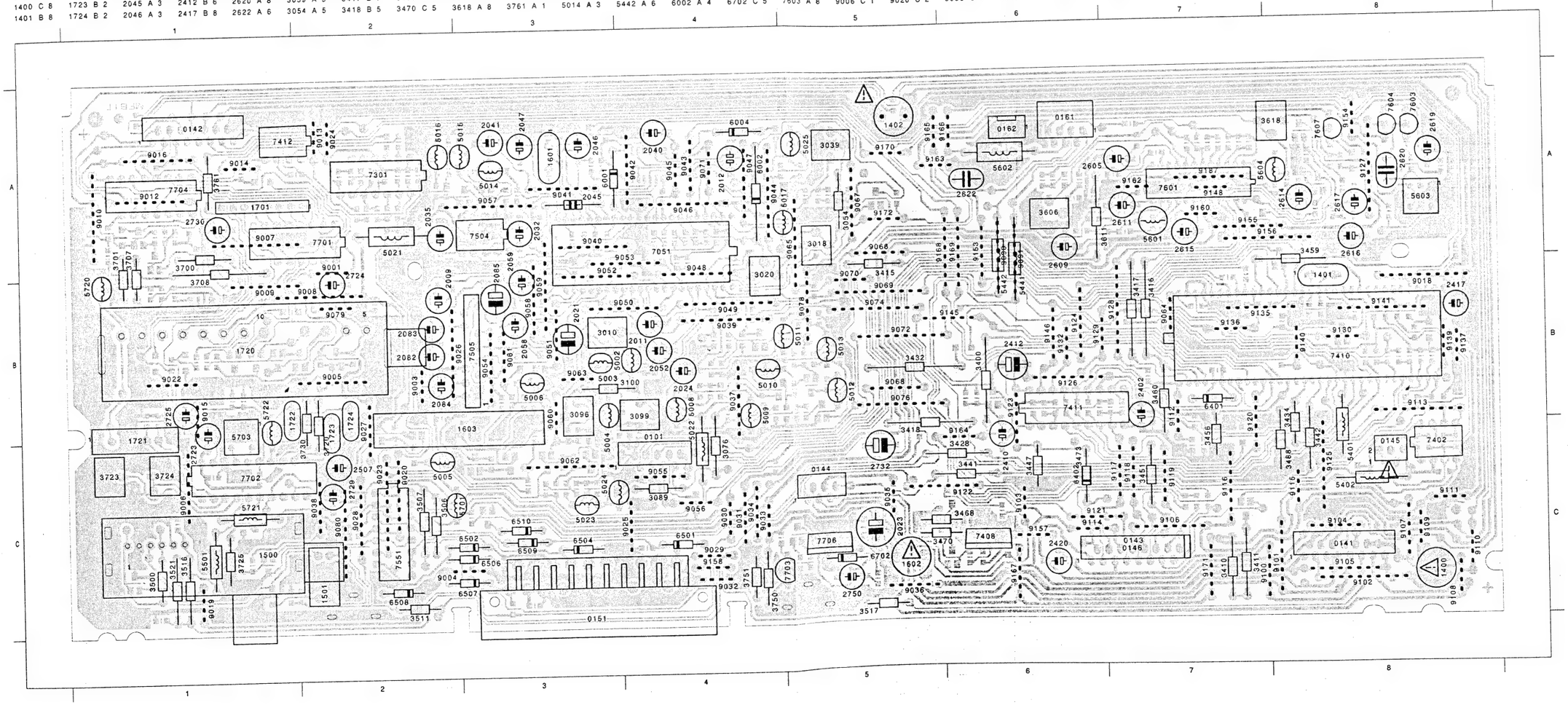
8 7 6 5 4 3 2 1



FAMILY BOARD **N1** **N2**

"INSERTED COMPONENTS ARE DEPENDENT ON THE SET TYPE"

0101 C 4	1402 A 5	2009 B 2	2047 A 3	2420 C 6	2723 B 1	3076 C 4	3428 C 6	3473 C 6	3700 A 1	5002 B 4	5015 A 3	5501 C 1	6004 A 4	7051 A 4	7604 A 8	9007 A 1	9022 B 1	9034 C 4	9046 A 4	9058 B 3	9070 B 5	9102 C 8	9114 C 6	9126 B 6	9145 B 6	9164 C 6
0141 C 8	1500 C 1	2011 B 4	2052 B 4	2507 C 2	2724 B 2	3089 C 4	3432 B 5	3488 C 8	3701 A 1	5003 B 3	5016 A 2	5601 A 7	6401 B 7	7301 A 2	7607 A 8	9008 B 2	9023 C 2	9035 C 5	9047 A 4	9059 B 3	9071 A 4	9103 C 6	9115 C 8	9127 A 8	9146 B 6	9165 A 5
0142 A 1	1501 C 2	2012 A 4	2058 B 3	2605 A 7	2725 B 1	3096 B 3	3434 C 8	3500 C 1	3707 A 1	5004 B 3	5017 A 5	5602 A 6	6402 C 6	7402 C 8	7701 A 2	9009 B 1	9024 A 2	9036 C 5	9048 B 4	9060 B 3	9072 B 5	9104 C 8	9116 C 7	9128 B 7	9148 A 7	9166 A 6
0143 C 7	1601 A 3	2021 B 3	2059 B 3	2609 A 6	2729 C 2	3099 B 4	3441 C 6	3506 C 2	3708 A 1	5005 C 2	5021 A 2	5603 A 8	6501 C 4	7408 C 6	7702 C 1	9010 A 1	9025 C 4	9037 B 4	9049 B 4	9061 B 3	9074 B 5	9105 C 8	9117 C 7	9129 B 6	9153 A 6	9167 C 6
0144 C 5	1602 C 5	2023 C 5	2082 B 2	2611 A 7	2730 A 1	3100 B 3	3442 C 8	3507 C 2	3720 B 2	5006 B 3	5022 C 4	5604 A 8	6502 C 3	7410 B 8	7703 C 5	9012 A 1	9026 B 2	9038 C 2	9050 B 4	9062 C 3	9076 B 5	9106 C 7	9118 C 7	9130 B 8	9154 A 8	9168 A 6
0145 C 8	1603 B 3	2024 B 4	2083 B 2	2614 A 8	2732 C 5	3400 B 6	3447 C 6	3511 C 2	3723 C 1	5008 B 4	5023 C 3	5701 C 2	6504 C 3	7411 C 6	7704 A 1	9013 A 2	9027 B 2	9039 B 4	9051 B 3	9063 B 3	9078 B 5	9107 C 8	9119 C 7	9132 B 6	9155 A 7	9169 A 6
0146 C 7	1701 A 1	2032 A 3	2084 B 2	2615 A 7	2750 C 5	3410 C 7	3451 C 7	3516 C 1	3724 C 1	5009 B 4	5024 C 3	5703 B 1	6506 C 3	7412 A 2	7706 C 5	9014 A 1	9028 C 2	9040 A 3	9052 B 3	9064 B 7	9079 B 2	9108 C 8	9120 C 7	9135 B 7	9156 A 8	9170 A 5
0151 C 3	1720 B 2	2035 A 2	2085 B 3	2616 A 8	3010 B 3	3411 C 7	3456 C 7	3517 C 5	3725 C 1	5010 B 4	5025 A 5	5720 B 1	6507 C 3	7504 A 3	9001 A 2	9015 B 1	9029 C 4	9041 A 3	9053 A 4	9065 A 5	9080 C 2	9109 C 8	9121 C 6	9136 B 7	9157 C 6	9171 C 7
0161 A 6	1721 B 1	2040 A 4	2402 B 7	2617 A 8	3018 A 5	3415 A 5	3459 B 8	3521 C 1	3730 B 2	5011 B 5	5401 C 8	5721 C 1	6508 C 2	7505 B 3	9003 B 2	9016 A 1	9030 C 4	9042 A 4	9054 B 3	9066 A 5	9090 A 6	9110 C 8	9122 C 5	9137 B 8	9158 C 4	9172 A 5
0162 A 6	1722 B 1	2041 A 3	2410 C 6	2619 A 8	3020 B 4	3416 B 7	3460 B 7	3606 A 6	3750 C 4	5012 B 5	5402 C 8	5722 B 1	6509 C 3	7551 C 2	9004 C 3	9018 B 8	9031 C 4	9043 A 4	9055 C 4	9067 A 5	9091 A 6	9111 C 8	9123 B 6	9139 B 8	9160 A 7	9187 A 7
1400 C 8	1723 B 2	2045 A 3	2412 B 6	2620 A 8	3039 A 5	3417 B 7	3468 C 5	3611 A 6	3751 C 4	5013 B 5	5441 A 6	6001 A 3	6510 C 3	7601 A 7	9005 B 2	9019 C 1	9032 C 4	9044 A 4	9056 C 4	9068 B 5	9100 C 7	9112 B 7	9124 B 6	9140 B 8	9162 A 7	
1401 B 8	1724 B 2	2046 A 3	2417 B 8	2622 A 6	3054 A 5	3418 B 5	3470 C 5	3618 A 8	3761 A 1	5014 A 3	5442 A 6	6002 A 4	6702 C 5	7603 A 8	9006 C 1	9020 C 2	9033 C 4	9045 A 4	9057 A 3	9069 B 5	9101 C 8	9113 B 8	9125 C 8	9141 B 8	9163 A 5	



FAMILY BOARD FRONT END - FV N1 N2

	SYSTEM	TUNER	OFW	TRAP (POS 1722)	BANDPASS (POS 1723/1724)
VST	PAL BG	UV917	G1966M	TPS5.5MB-TF21F	SFSH5.5MDB
VST	PAL I	U943	J1952	TPS6.0MB-TF21F	SFE6,0MB
VST	PAL BG SEC DK	UV917	K2950M	TPS6.5MB-TF21F	SFSH5.5MDB SFSH6,5MDB
PLL	PAL BG HYP	UV916E	G1966M	TPS5.5MB-TF21F	SFSH5.5MDB
PLL	PAL I HYP	U944C	J1952	TPS6.0MB-TF21F	SFE6,0MB
PLL	PAL BG SEC DK	UV916E	K2950M	TPS6.5MB-TF21F	SFSH5.5MDB SFSH6,5MDB

IN CASE OF REPLACEMENT SEE FRONT END ADJUSTMENTS

UV917
1720

OFW
1721

7702
TDA9800/V3

INTERNAL REFERANCE VOLTAGE
TRAVELING WAVE DIVIDER
VCO
AFC
AF AMPLIFIER
3-stage IF-amplifier
FREQUENCY DETECTOR AND PHASE DETECTOR
VIDEO DEMODULATOR
VIDEO AMPLIFIER
FM-PLL
TUNER AGC
IF AGC
AGC DETECTOR
BUFFER AND NOISE CLIPPING

AFC-ADJ.
AGC-ADJ.
TRAP
BANDPASS
for sec_DK and pal_BG only
delete for pal_BG
deleted for eco
for PLL only
for vst only and delete for pal-I
for VST only
not used

SHIFTREGISTER
HEF4094BP
7701
HEF4104BP
7704
CONVERTER LEVEL
LM358DT
7700
1701

TO DE

SDA STROBE PWM SCL AGC AFC

AFV TO VS/IO
VFV TO VS/IO
+33V
5VAS
+14A

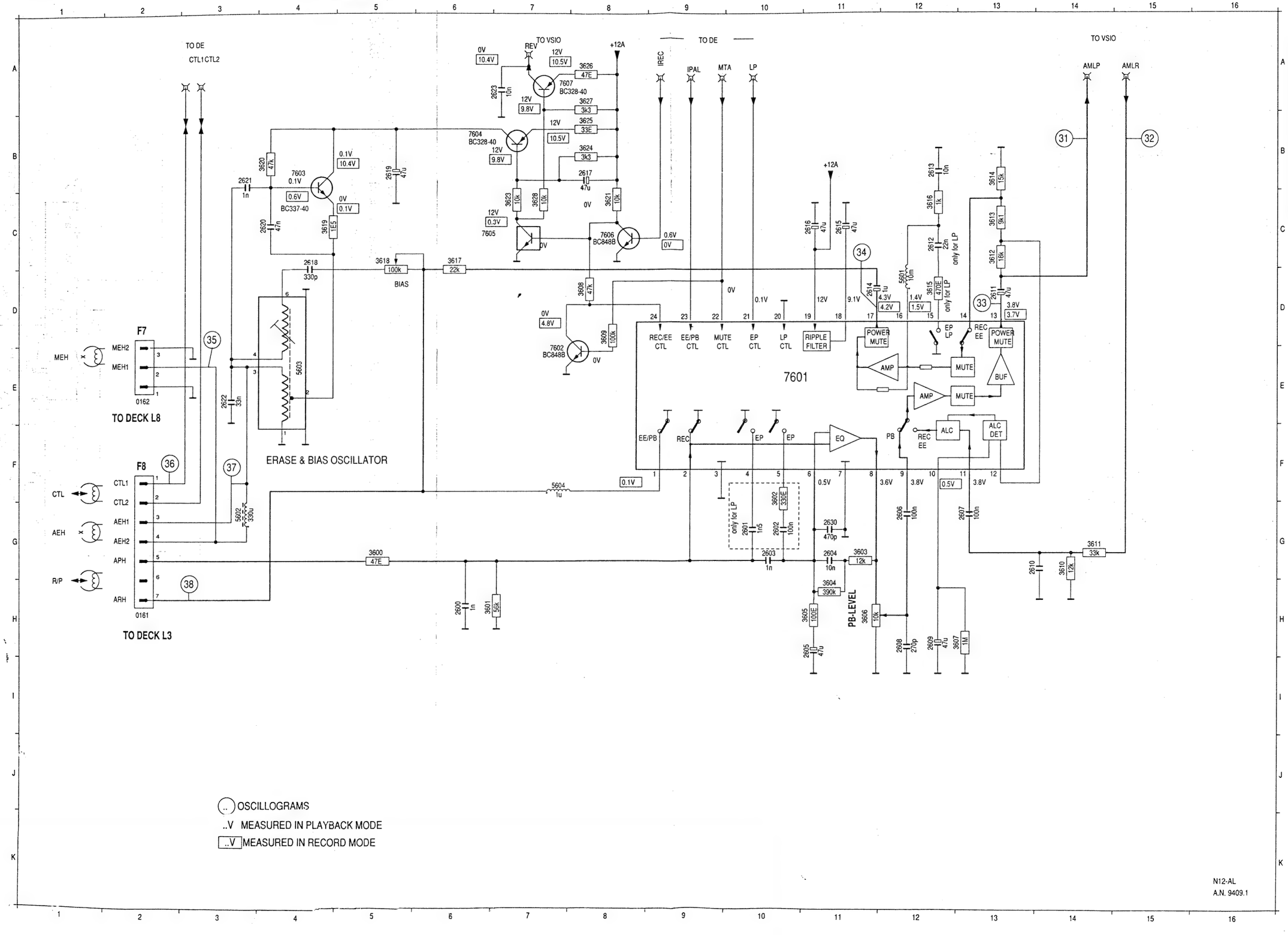
..V MEASURED IN PLAYBACK MODE
[..V] MEASURED IN RECORD MODE
TUNED TO UHF APPROX. CH 26
OUTPUTVOLTAGES IC7701 SHOULD BE 0V OR 11.9V
(..) OSCILLOGRAMS

N12-FV
A.N. 9408.1

1701 K2
1720 B4
1721 C7
1722 E12
1723 E13
1724 F13
2700 J6
2701 I7
2702 J7
2703 A2
2704 I5
2705 I8
2707 E5
2720 C8
2721 C8
2722 A10
2723 A10
2724 D7
2725 E11
2726 E11
2727 A11
2728 B15
2729 C14
2730 K4
2732 H12
2733 E5
2750 H14
2760 F4
3700 F8
3701 K9
3702 E4
3703 E3
3704 I5
3705 I6
3706 J7
3707 J9
3708 K9
3720 D8
3721 D7
3722 D7
3723 D8
3724 E9
3725 A11
3728 A14
3729 B14
3730 E12
3731 E13
3732 D14
3733 E15
3735 G2
3736 G1
3739 F4
3740 F13
3741 F8
3742 F7
3743 E7
3744 E6
3745 F4
3746 G10
3747 H10
3750 H12
3751 I12
3752 H13
3753 I14
3754 H15
3755 G15
3756 H14
3757 H13
3760 J6
3761 E10
3953 E5
3954 D7
5701 G12
5703 A12
5720 C6
5721 A9
5722 E12
6702 H14
7700 I8
7700 F8
7701 H4
7702 C12
7703 I14
7704 F8
7705 D15
7706 G15
7707 H14
7708 G2
7709 F3
7710 F1
7711 G1
7712 D7
7713 E6
7714 E7

3-29

FAMILY BOARD AUDIO LINEAR - AL N1 N2



0161 H 2
0162 E 2
2600 H 6
2601 G10
2602 G10
2603 G10
2604 G11
2605 H11
2606 G12
2607 G13
2608 H12
2609 H12
2610 G13
2611 D13
2612 C12
2613 B12
2614 D11
2615 C11
2616 C11
2617 B 8
2618 C 4
2619 B 5
2620 C 4
2621 B 3
2622 E 3
2623 A 7
2630 G11
3600 G 5
3601 H 6
3602 F10
3603 G11
3604 H11
3605 H11
3606 H11
3607 H13
3608 D 8
3609 D 8
3610 G14
3611 G14
3612 C13
3613 C13
3614 B13
3615 D12
3616 C12
3617 C 6
3618 C 5
3619 C 4
3620 B 4
3621 C 8
3623 C 7
3624 B 8
3625 B 8
3626 A 8
3627 A 8
3628 C 7
5601 D12
5602 G 3
5603 E 4
5604 F 7
7601 E10
7602 E 7
7603 B 4
7604 B 6
7605 C 6
7606 C 8
7607 A 7

PCS 74527

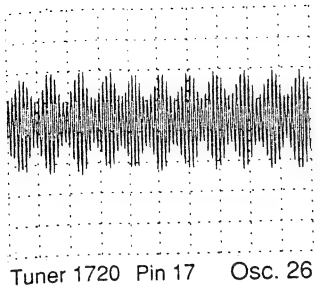
V/Div, 10 ms/Div
← 0V
F8,1 Osc. 36
V/Div, 5 us/Div
← 0V
F8,3 Osc. 37
se head (AEH1)
V/Div, 5 us/Div
← 0V
r F8,7 Osc. 38
P Head (ARH)

rams are measured in
Record .

3-29

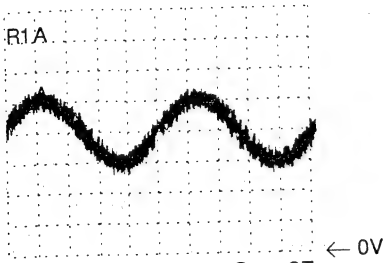
OSCILLOGRAMS FRONTEND - FV

A: DC, 0.1 V/Div 0.2 us/Div



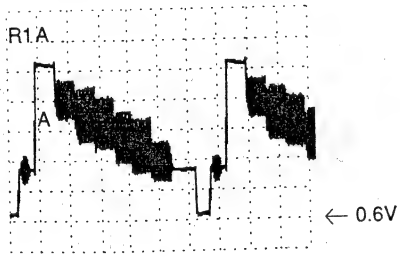
Tuner 1720 Pin 17 Osc. 26

A: DC, 0.5 V/Div 0.2 ms/Div



IC 7702 Pin 9 Osc. 27
AFV

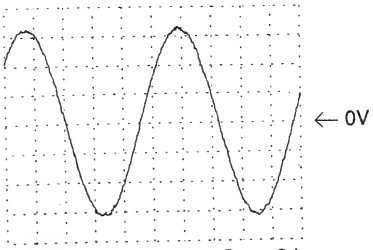
A: DC, 0.2 V/Div 10 us/Div



Transistor 7705-Emitter Osc. 28
VFV

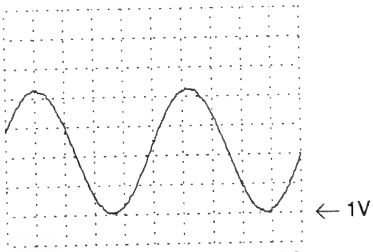
OSCILLOGRAMS AUDIO LINEAR - AL

A: DC, 0.2 V/Div, 0.2 ms/Div



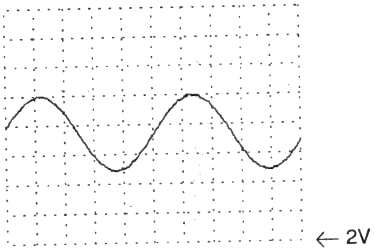
Capacitor 2611 Osc. 31
AMLP

A: DC, 0.2 V/Div, 0.2 ms/Div



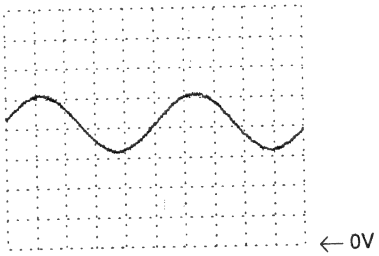
Resistor 3611 Osc. 32
AMLR

A: DC, 0.5 V/Div, 0.2 ms/Div



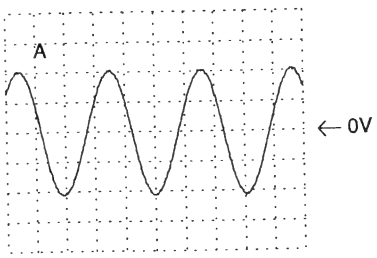
IC 7601 Pin 13 Osc. 33

A: DC, 1 V/Div, 0.2 ms/Div



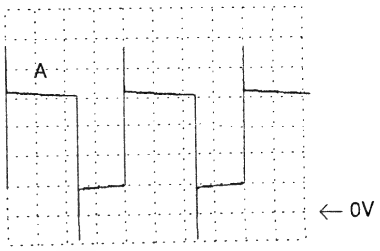
IC 7601 Pin 17 Osc. 34

A: DC, 0.1 V/Div, 5 us/Div



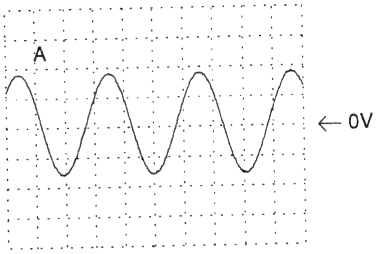
Connector F7,2 Osc. 35
Main erase head (MEH1)

A: DC, 1 V/Div, 10 ms/Div



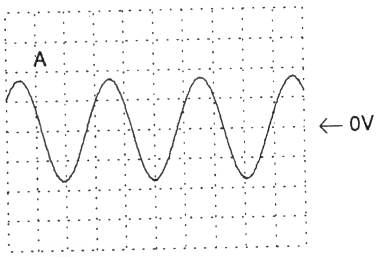
Connector F8,1 Osc. 36
CTL1

A: DC, 20 V/Div, 5 us/Div



Connector F8,3 Osc. 37
Audio erase head (AEH1)

A: DC, 10 V/Div, 5 us/Div



Connector F8,7 Osc. 38
Audio R/P Head (ARH)

Oscillograms are measured in Position Record .

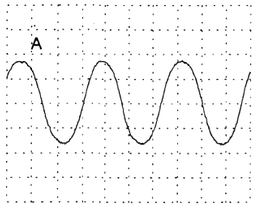
FAM

3-30

3-30

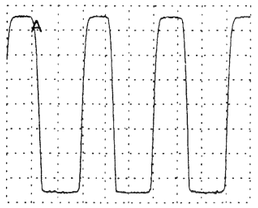
TAPE DECK SENSOR PANEL

A: AC, 0.5 V/Div, 0.2 ms/Div



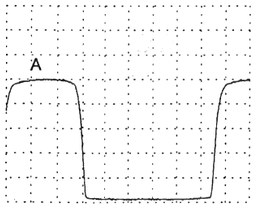
Connector L2,2
FG

A: DC, 0.5 V/Div, 2 ms/Div



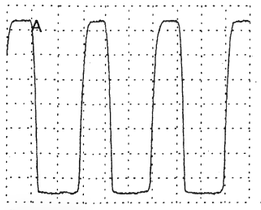
Connector L2,9
WTL Wind

A: DC, 1 V/Div, 2 ms/Div



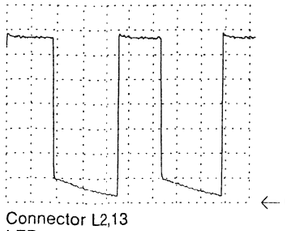
Connector L2,11
FTA Threading

A: DC, 0.5 V/Div, 2 ms/Div

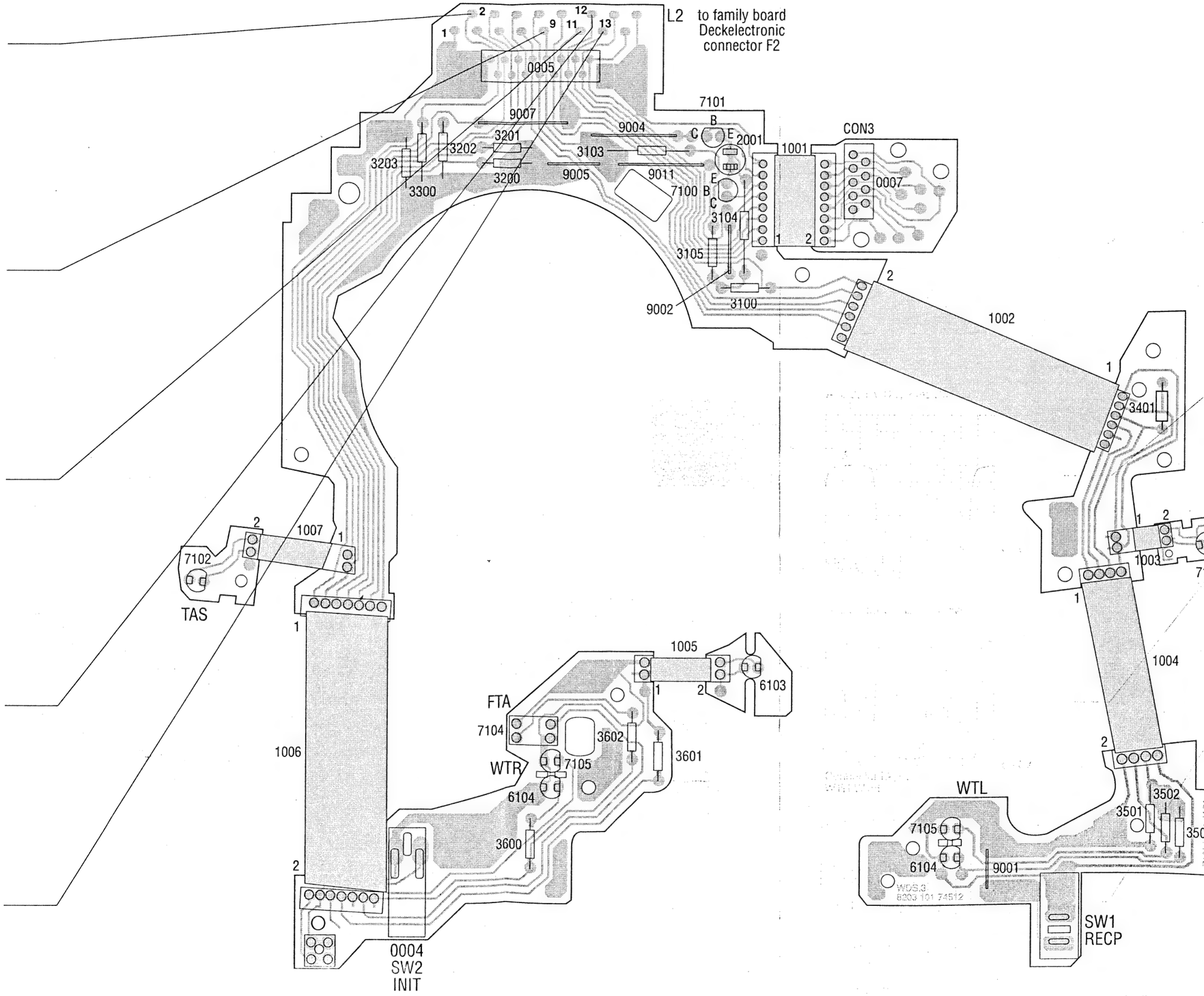


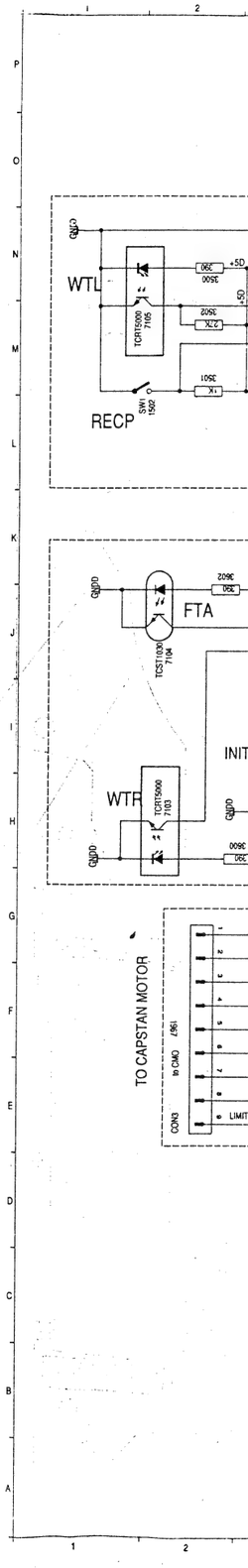
Connector L2,12
WTR Wind

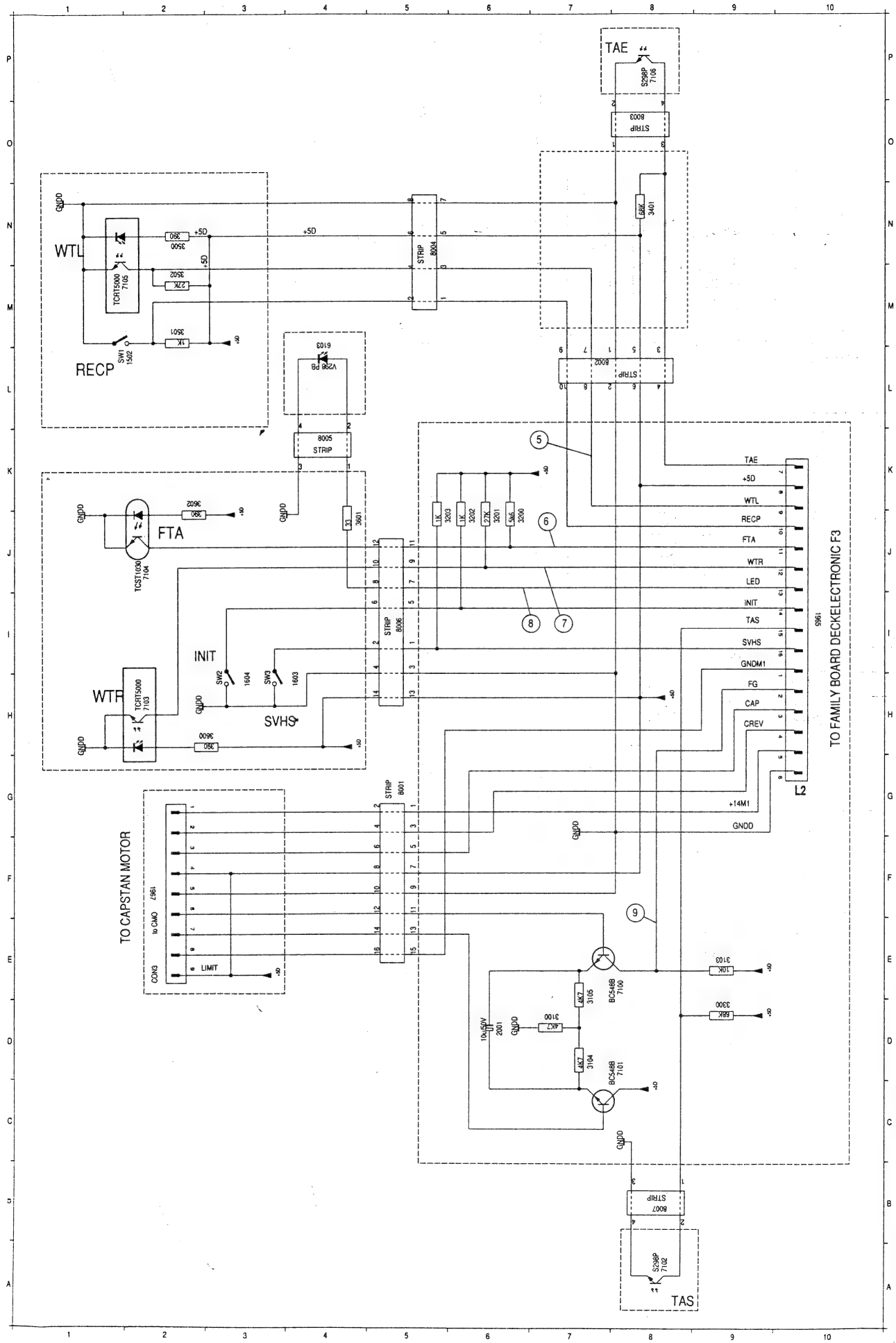
A: DC, 0.5 V/Div, 0.5 ms/Div



Connector L2,13
LED






TAE
WTL
RECP
FTA
WTR
INIT
SVHS
TAS
TO CAPSTAN MOTOR
TO FAMILY BOARD DECKELECTRONIC F3
L2
TAE
+5D
WTL
RECP
FTA
WTR
LED
INIT
TAS
SVHS
GNOM1
FG
CAP
CREV
+14M1
GNDD
LIMIT
SW1 L1
MP101 K9
8007 B8
8006 I5
8005 K4
8004 N5
8003 O8
8002 L7
8001 G5
7106 P8
7105 M1
7104 J2
7103 H2
7102 A8
7101 D8
7100 E8
6103 L4
3602 K2
3601 J4
3600 H2
3502 M2
3501 M2
3500 N2
3401 N8
3300 D9
3203 J5
3202 J6
3201 J6
3200 J6
3105 E7
3104 D7
3103 E9
3100 D7
2001 D6
1969 A7
1968 A6
1967 F2
1965 I10
1604 H3
1603 H4

3-31

FAMILY BOARD DECKELECTRONIC - DE N1 N2

TO DECK L4 THREADING MOTOR

TO HEAD AMPLIFIER L1

TO DECK L2 SENSOR PRINT

TVC 7410 TMP91C642AN

DECK INTERFACE

7411 SAA1310

EEPROM 7412 ST24C02A

only for Gemstar ST24c04

IN CASE OF REPLACEMENT MAKE ADJUSTMENT FOR GAP POSITION AND TUNING LIMITS (SEE FAMILY BOARD ADJUSTMENTS) AND PROGRAMMING OF THE FEATURE CODE (SEE SERVICE TEST PROGRAMM)

CAPSTAN SUPPLY SWITCH

	3463	3464
for other	10k	/
for PAL-I	10k	82k

TO DC1 OPERATING PANEL

TO SM111 POWER SUPPLY

to FV

to VS/IO

(..) OSCILLOGRAMS

...V MEASURED IN PLAYBACK MODE

[..V] MEASURED IN RECORD MODE

N12:DE
A.N 9499.1

OSCILLOGR

A: DC, 1 V/Div, 10 m

Connector F4,1
PG/FG

A: DC, 0.5 V/Div, 0.5

Connector F3,13
LED

A: DC, 0.5 V/Div, 2 m

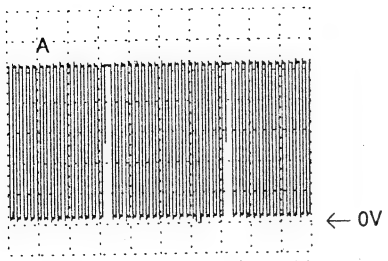
Connector F3,12
WTR Wind

A: DC, 1 V/Div, 2 ms

Connector F3,11
FTA Threading

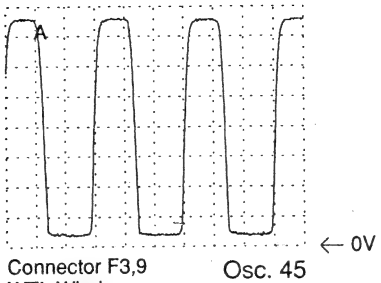
OSCILLOGRAMS DECKELECTRONIC - DE

A: DC, 1 V/Div, 10 ms/Div



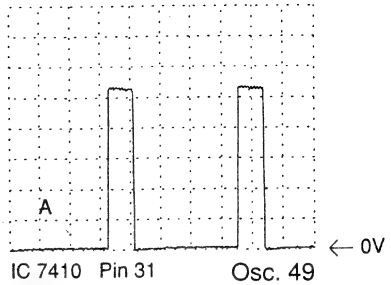
Connector F4,1 Osc. 41
PG/FG

A: DC, 0.5 V/Div, 2 ms/Div



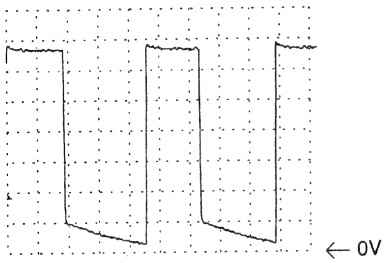
Connector F3,9 Osc. 45
WTL Wind

A: DC, 1 V/Div, 10 us/Div



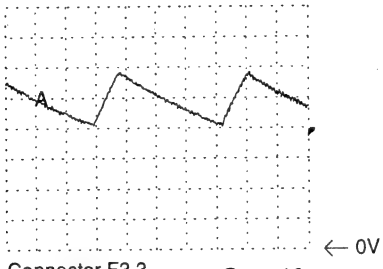
IC 7410 Pin 31 Osc. 49
CAP

A: DC, 0.5 V/Div, 0.5 ms/Div



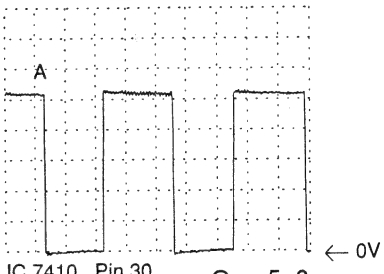
Connector F3,13 Osc. 42
LED

A: DC, 0.2 V/Div, 10 us/Div



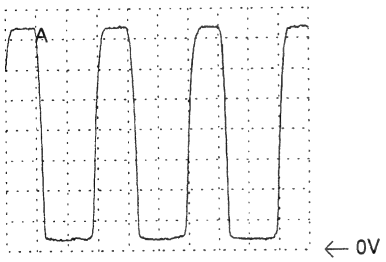
Connector F3,3 Osc. 46
CAP

A: DC, 1 V/Div, 10 us/Div



IC 7410 Pin 30 Osc. 5 0
REEL

A: DC, 0.5 V/Div, 2 ms/Div

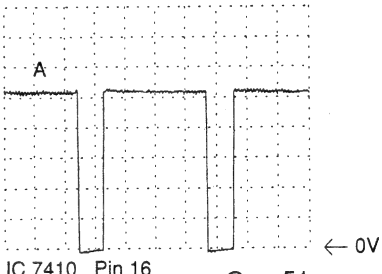


Connector F3,12 Osc. 43
WTR Wind

A: AC, 0.5 V/Div, 0.2 ms/Div

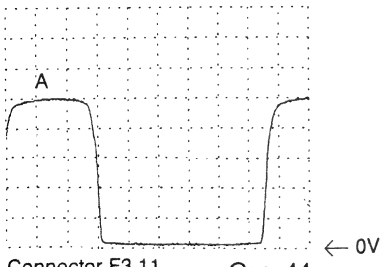
Connector F3,2 Osc. 47
FG

A: DC, 1 V/Div, 10 us/Div



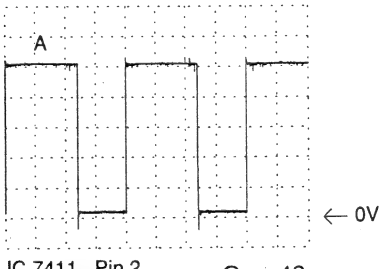
IC 7410 Pin 16 Osc. 51
THIO

A: DC, 1 V/Div, 2 ms/Div



Connector F3,11 Osc. 44
FTA Threading

A: DC, 1 V/Div, 10 ms/Div

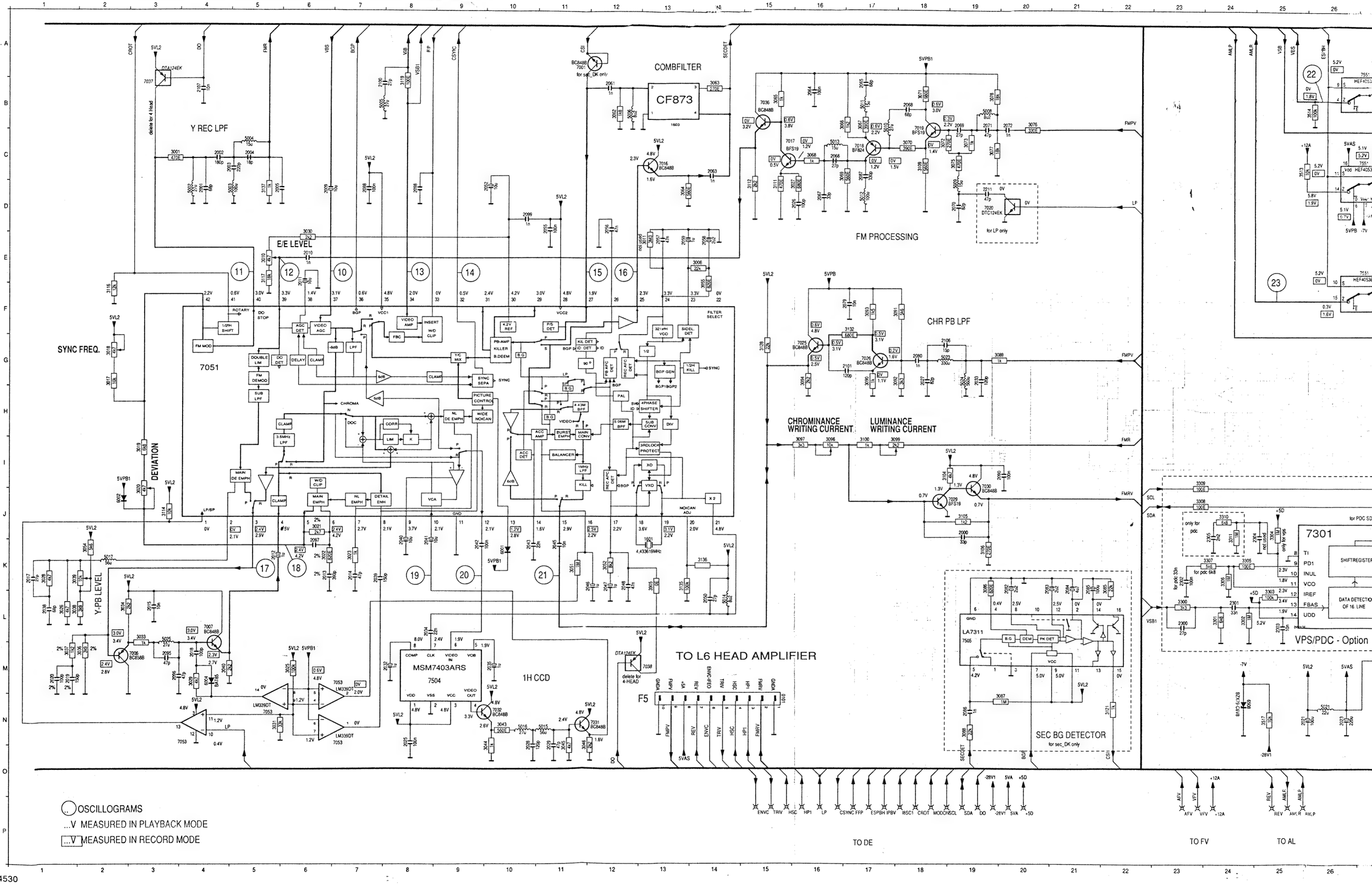


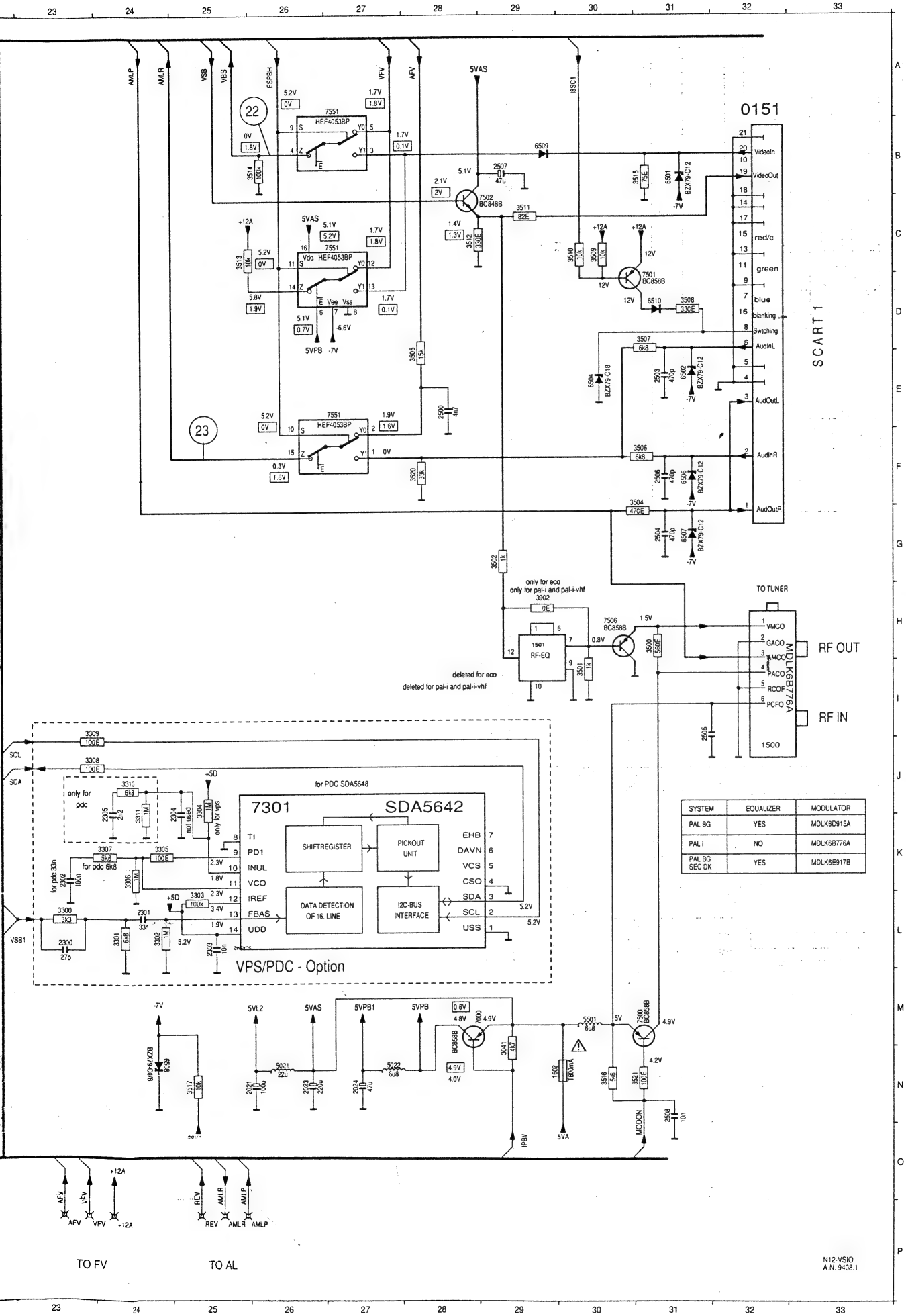
IC 7411 Pin 2 Osc. 48
CTL1 REC

3-32

3-32

FAMILY BOARD VIDEOSIGNALPROCESSING, IN/OUT - VSIO N1 N2





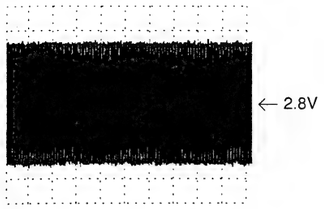
SYSTEM	EQUALIZER	MODULATOR
PAL BG	YES	MDLK6D915A
PAL I	NO	MDLK6B776A
PAL BG SEC DK	YES	MDLK6E917B

0101 N15
0151 B32
1500 J32
1501 H29
1601 K13
1602 N29
1603 B13
2000 J19
2001 D 4
2002 C 4
2003 C 4
2004 C 5
2005 D 5
2009 D 6
2010 E 6
2011 E 6
2012 K 5
2013 K 6
2014 K 7
2015 L 3
2017 K 1
2019 M 1
2020 M 1
2021 N25
2023 N26
2024 N27
2025 N 8
2026 D16
2027 G18
2028 O10
2029 O11
2032 M 8
2033 G19
2034 L 8
2035 M10
2038 L 1
2039 K 7
2040 K 8
2041 K 8
2042 K 9
2043 K10
2045 K11
2046 K12
2047 K12
2048 K12
2050 L14
2052 D10
2055 D11
2056 D12
2057 E13
2058 E14
2059 E13
2061 B12
2063 C14
2064 B16
2065 B17
2066 C16
2067 D16
2068 B18
2069 B19
2070 D19
2071 B19
2072 B20
2079 F17
2080 G18
2082 K20
2083 K20
2084 K21
2085 K21
2086 N19
2087 C17
2088 D 7
2090 I20
2095 M 3
2096 M 3
2097 K 6
2098 D 8
2099 D10
2100 B 7
2101 G17
2106 G18
2107 B 4
2211 D19
2300 L23
2301 L24
2302 K23
2303 L25
2304 J25
2305 J24
2500 E28
2503 E31
2504 G31
2505 I31
2506 F31
2507 B29
2508 N31
3001 C 3
3008 E14
3010 E 5
3011 E13
3017 G 2
3018 G 2
3019 I 3
3020 J 3
3021 J 6
3022 K 6
3023 K 7
3025 M 6
3026 L 1
3027 D16
3028 K 1
3029 M 4
3030 E 6
3031 N 5
3033 L 3
3034 L 2
3036 M 2
3037 M 1
3038 L 1
3039 K 1
3040 M 4
3041 N29
3043 N10
3044 O10
3045 O11
3046 O11
3051 K11
3052 K12
3054 K 2
3055 F14
3062 B12
3063 B14
3064 D13
3065 B15
3066 B16
3067 B17
3068 C16
3069 C16
3070 C18
3071 B18
3072 C18
3073 C19
3075 C19
3076 B20
3077 C19
3078 B19
3085 K22
3086 K19
3087 N20
3088 N19
3089 G19
3090 G17
3091 F18
3092 G18
3093 F17
3094 G16
3096 I16
3097 I16
3099 I17
3100 I17
3104 I18
3105 J19
3106 K19
3109 C18
3111 D15
3112 D15
3114 J 3
3116 F 2
3117 E 5
3119 B 8
3121 N22
3128 G15
3132 F17
3135 K13
3136 K14
3137 D 5
3300 L23
3301 L24
3302 L24
3303 L25
3304 J25
3305 K24
3306 K24
3307 K24
3308 J23
3309 I23
3310 J24
3311 J24
3500 H31
3501 I30
3502 G29
3504 G31
3505 E28
3506 F31
3507 D31
3508 D31
3509 C30
3510 C30
3511 C29
3512 C28
3513 C25
3514 B26
3515 B31
3516 N30
3517 N25
3520 F28
3521 N31
3902 H29
3905 K13
5002 D 4
5003 D 5
5004 C 5
5005 B 7
5006 B12
5008 B19
5009 D19
5010 B17
5011 B17
5012 D17
5013 C16
5014 L14
5015 N11
5016 N10
5017 K 2
5021 N26
5022 N27
5023 G18
5024 G19
5025 L 3
5501 M30
6001 K10
6002 J 2
6004 M 4
6501 B31
6502 E31
6504 E30
6506 F31
6507 G31
6508 N24
6509 B29
6510 D31
7000 M28
7001 A11
7006 M 3
7007 L 4
7016 C13
7017 C16
7018 C17
7019 C18
7020 D19
7025 G16
7026 G17
7029 J19
7030 J19
7031 N12
7032 N10
7036 B15
7037 B 3
7038 M13
7051 G 4
7053 M 7
7053 N 7
7053 N 5
7053 N 4
7301 J25
7500 M31
7501 D31
7502 C29
7504 M 8
7505 M19
7506 H30
7551 C27
7551 E27
7551 A27

OSCILLOGRAMS VIDEOSIGNALPROCESSING, IN/OUT - VS/IO

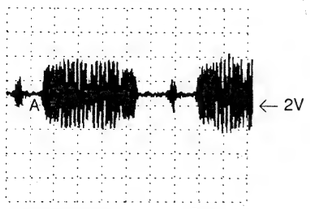
UNLESS OTHERWISE INDICATED MEASURED IN POSITION RECORD

A: AC, 0.2 V/Div , 2 us/Div



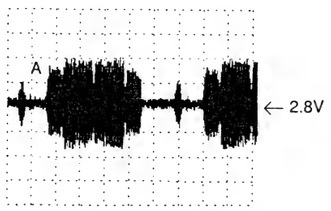
IC 7051 Pin 40 Osc. 11

A: DC, 0.5 V/Div , 10 us/Div



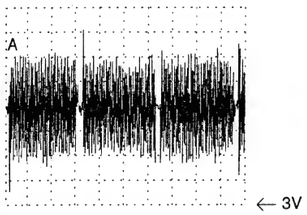
IC 7051 Pin 25 Osc. 16
(measured in playback)

A: AC, 0.1 V/Div , 10 us/Div



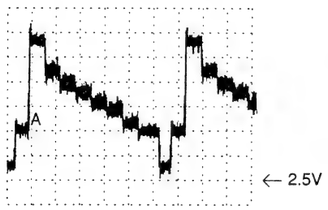
IC 7051 Pin 15 Osc. 21

A: AC, 50 mV/Div , 20 us/Div



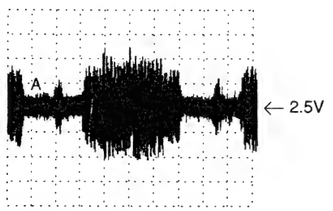
IC 7051 Pin 39 Osc. 12
(measured in playback)

A: AC, 0.1 V/Div , 10 us/Div



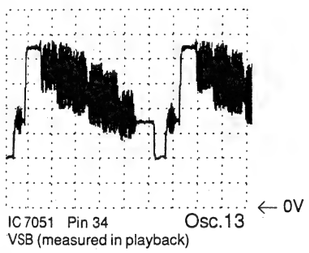
IC 7051 Pin 3 Osc. 17
(measured in playback)

A: AC, 0.2 V/Div , 10 us/Div



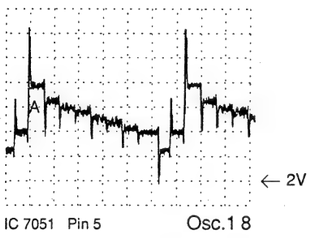
IC 7051 Pin 15 Osc. 21
(measured in playback)

A: DC, 0.5 V/Div 10 us/Div



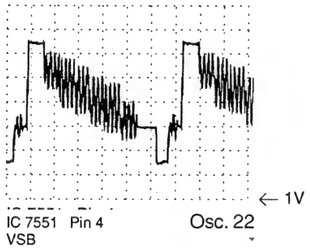
IC 7051 Pin 34 Osc.13
VSB (measured in playback)

A: DC, 0.2 V/Div , 10 us/Div



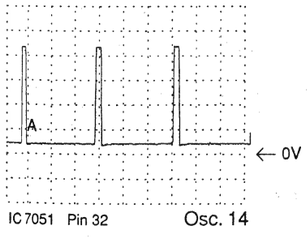
IC 7051 Pin 5 Osc.1 8

A: DC, 0.2 V/Div 10 us/Div



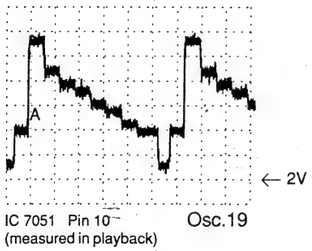
IC 7551 Pin 4 Osc. 22
VSB

A: DC, 1.0 V/Div , 20 us/Div



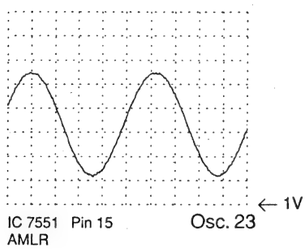
IC 7051 Pin 32 Osc. 14

A: AC, 0.1 V/Div , 10 us/Div



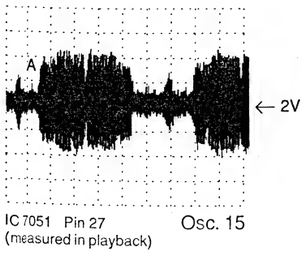
IC 7051 Pin 10 Osc.19
(measured in playback)

A: DC, 0.2 V/Div 0.2 ms/Div



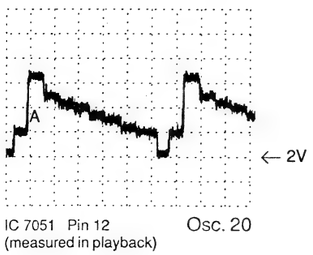
IC 7551 Pin 15 Osc. 23
AMLR

A: AC, 50 mV/Div , 5 ms/Div



IC 7051 Pin 27 Osc. 15
(measured in playback)

A: AC, 0.1 V/Div , 10 us/Div

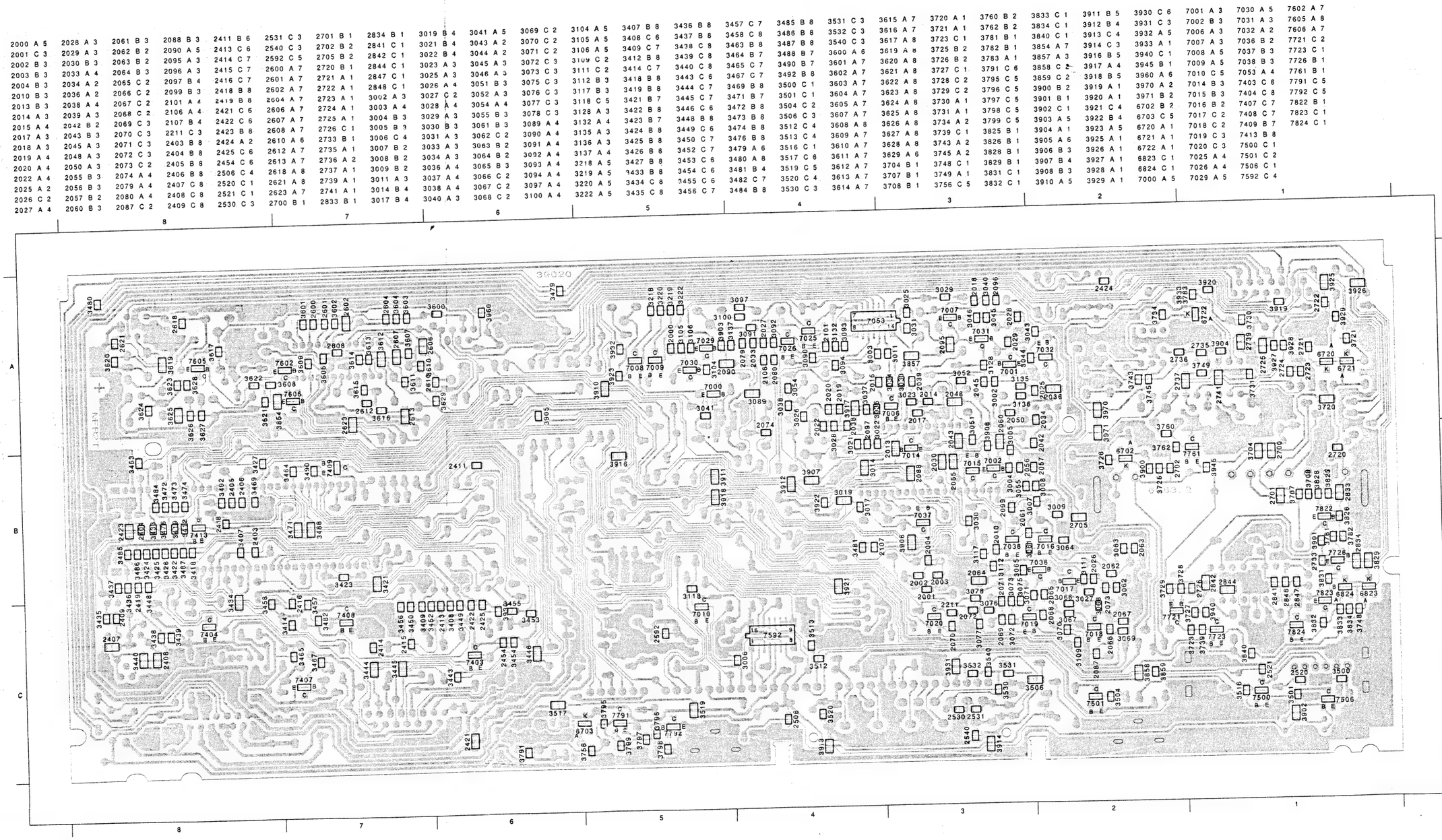


IC 7051 Pin 12 Osc. 20
(measured in playback)

REMARKS :

FAMILY BOARD N3 N5

"INSERTED COMPONENTS ARE DEPENDENT ON THE SET TYPE"



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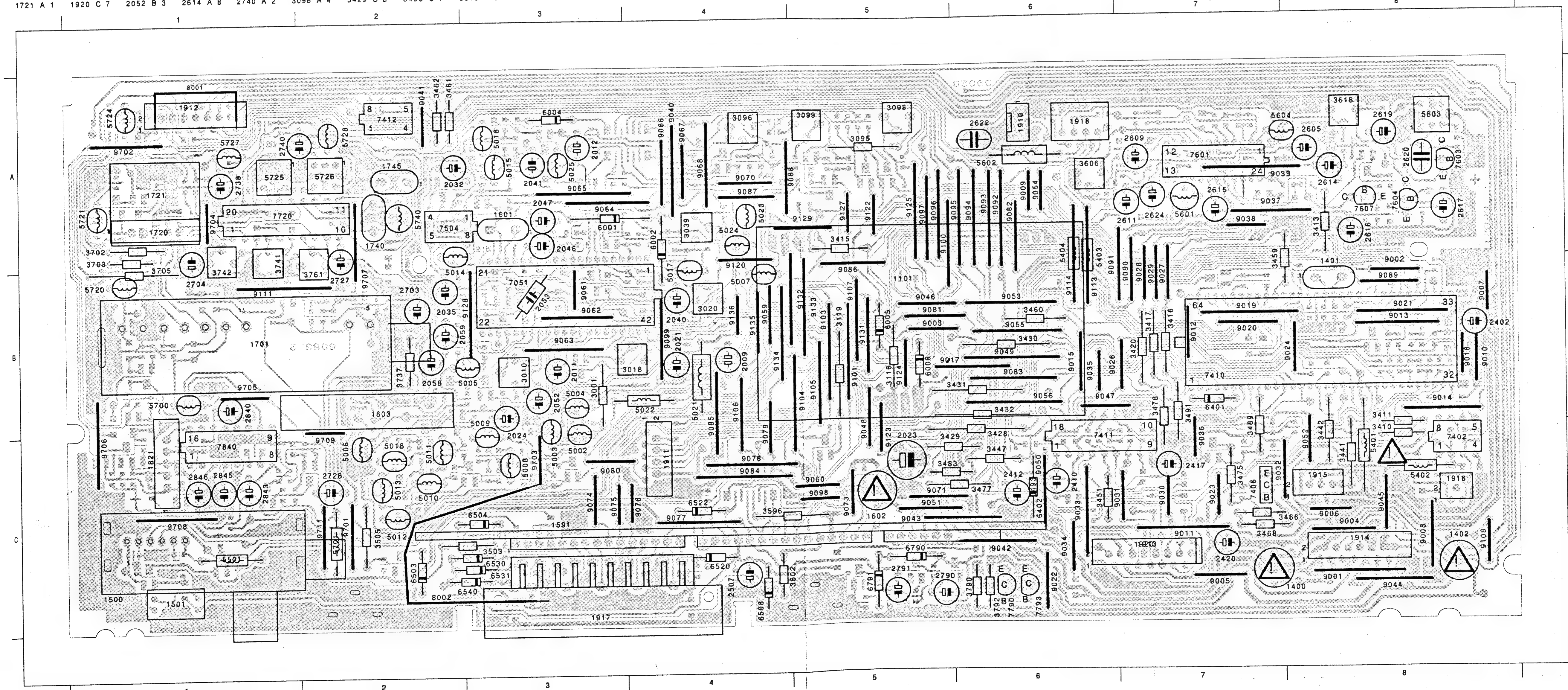
FAMILY BOARD N3 N5

"INSERTED COMPONENTS ARE DEPENDENT ON THE SET TYPE"

1101 B 6	1740 A 2	2009 B 4	2053 B 3	2615 A 7	2790 C 5	3098 A 5	3430 B 6	3475 C 7
1400 C 7	1745 A 2	2011 B 3	2058 B 2	2616 A 8	2791 C 5	3099 A 5	3431 B 6	3477 C 6
1401 B 8	1821 C 1	2012 A 3	2059 B 2	2617 A 8	2840 B 1	3116 B 5	3432 B 6	3478 B 7
1402 C 8	1911 C 4	2021 B 4	2402 B 8	2619 A 8	2843 C 1	3119 B 5	3441 C 8	3483 C 5
1500 C 1	1912 A 1	2023 C 5	2410 C 6	2620 A 8	2845 C 1	3410 C 8	3442 C 8	3489 C 7
1501 C 1	1913 C 7	2024 B 3	2412 C 6	2622 A 6	2846 C 1	3411 C 8	3447 C 6	3491 B 7
1591 C 3	1914 C 8	2032 A 2	2417 C 7	2624 A 7	3001 B 3	3413 A 8	3451 C 6	3493 C 6
1601 A 3	1915 C 8	2035 B 2	2420 C 7	2703 B 2	3010 B 3	3415 A 5	3459 B 8	3502 C 4
1602 C 5	1916 C 8	2040 B 4	2507 C 4	2704 A 1	3018 B 4	3416 B 7	3460 B 6	3503 C 3
1603 B 2	1917 C 3	2041 A 3	2605 A 8	2727 A 2	3020 B 4	3417 B 7	3461 A 2	3505 C 2
1701 B 1	1918 A 6	2046 A 3	2609 A 7	2728 C 2	3039 A 4	3420 B 7	3462 A 2	3596 C 5
1720 A 1	1919 A 6	2047 A 3	2611 A 7	2738 A 1	3095 A 5	3428 C 6	3466 C 7	3606 A 6
1721 A 1	1920 C 7	2052 B 3	2614 A 8	2740 A 2	3096 A 4	3429 C 5	3468 C 7	3618 A 8

3702 A 1	5006 C 2	5021 B 4	5604 A 8	6004 A 3	6790 C 5	7720 A 1	9010 B 8	9024 B 8
3703 A 1	5007 B 4	5022 B 4	5700 B 1	6005 B 5	6791 C 5	7790 C 6	9011 C 7	9026 B 7
3705 B 1	5008 C 3	5023 A 4	5701 C 2	6006 B 5	7051 B 3	7793 C 6	9012 B 7	9027 B 7
3737 B 2	5009 C 3	5024 A 4	5720 B 1	6401 B 7	7402 C 8	7840 C 1	9013 B 8	9028 B 7
3741 A 1	5010 C 2	5025 A 3	5721 A 1	6402 C 6	7406 C 7	9001 C 8	9014 B 8	9029 B 7
3742 A 1	5011 C 2	5401 C 8	5724 A 1	6503 C 2	7410 B 8	9002 B 8	9015 B 6	9030 C 7
3761 A 2	5012 C 2	5402 C 8	5725 A 1	6504 C 3	7411 C 6	9003 B 5	9017 B 6	9031 C 7
3790 C 6	5013 C 2	5403 A 6	5726 A 2	6508 C 4	7412 A 2	9004 C 8	9018 B 8	9032 C 7
3792 C 6	5014 A 2	5404 A 6	5727 A 1	6520 C 4	7504 A 2	9005 C 7	9019 B 7	9033 C 6
5002 C 3	5015 A 3	5501 C 1	5728 A 2	6522 C 4	7601 A 7	9006 C 8	9020 B 7	9034 C 6
5003 C 3	5016 A 3	5601 A 7	5740 A 2	6530 C 3	7603 A 8	9007 B 8	9021 B 8	9035 B 6
5004 B 3	5017 B 4	5602 A 6	6001 A 3	6531 C 3	7604 A 8	9008 C 8	9022 C 6	9036 C 7
5005 B 3	5018 C 2	5603 A 8	6002 A 4	6540 C 3	7607 A 8	9009 A 6	9023 C 7	9037 A 7

9038 A 7	9051 C 5	9066 A 4	9081 B 5	9094 A 6	9108 C 8	9132 B 5	9709 B 2
9039 A 7	9052 C 8	9067 A 4	9082 A 6	9095 A 6	9111 B 1	9133 B 5	9711 C 2
9040 A 4	9053 B 6	9068 A 4	9083 B 6	9096 A 5	9113 A 6	9134 B 4	
9041 A 2	9054 A 6	9070 A 4	9084 C 4	9097 A 5	9114 A 6	9135 B 4	
9042 C 6	9055 B 6	9071 C 5	9085 B 4	9098 C 5	9120 A 4	9136 B 4	
9043 C 6	9056 B 6	9073 C 5	9086 B 5	9099 B 4	9122 A 5	9701 C 2	
9044 C 8	9059 B 4	9074 C 3	9087 A 4	9100 A 5	9123 C 5	9702 A 1	
9045 C 8	9060 C 5	9075 C 3	9088 A 4	9101 B 5	9124 B 5	9703 C 3	
9046 B 5	9061 B 3	9076 C 4	9089 B 8	9103 B 5	9125 A 5	9704 A 1	
9047 B 6	9062 B 3	9077 C 4	9090 B 7	9104 B 5	9127 A 5	9705 B 1	
9048 B 5	9063 B 3	9078 C 4	9091 B 7	9105 B 5	9128 B 3	9706 C 1	
9049 B 6	9064 A 3	9079 B 4	9092 A 6	9106 B 4	9129 A 5	9707 A 2	
9050 C 6	9065 A 3	9080 C 3	9093 A 6	9107 B 5	9131 B 5	9708 C 1	



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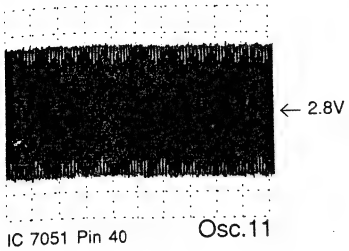
OSCILLOGRAMS
VIDEOSIGNALPROCESSING -VS

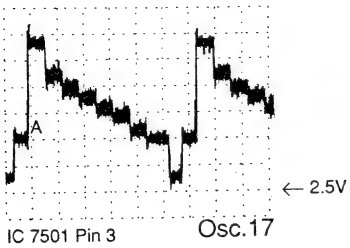
Unless otherwise indicated measured in position record.

A: AC, 0.2 V/Div , 2 us/Div



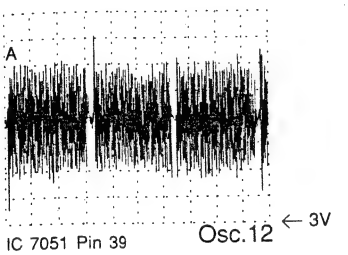
IC 7051 Pin 40 Osc.11

A: AC, 0.1 V/Div , 10 us/Div



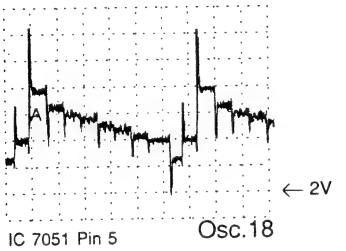
IC 7501 Pin 3 Osc.17

A: AC, 50 mV/Div , 20 us/Div



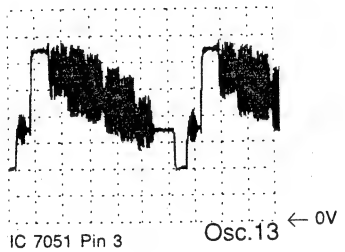
IC 7051 Pin 39 Osc.12
(measured in playback)

A: DC, 0.2 V/Div , 10 us/Div



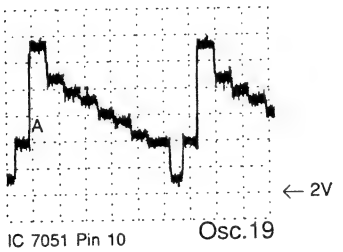
IC 7051 Pin 5 Osc.18

A: DC, 0.5 V/Div 10 us/Div



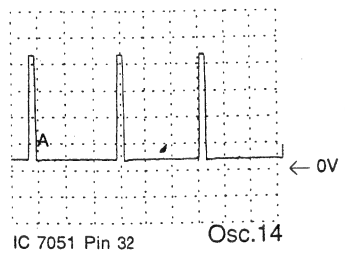
IC 7051 Pin 3 Osc.13
VSB(meas. in playback)

A: AC, 0.1 V/Div , 10 us/Div



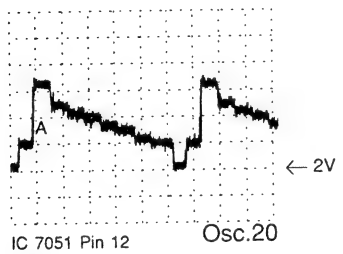
IC 7051 Pin 10 Osc.19
(measured in playback)

A: DC, 1.0 V/Div , 20 us/Div



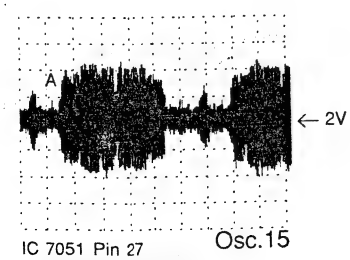
IC 7051 Pin 32 Osc.14

A: AC, 0.1 V/Div , 10 us/Div



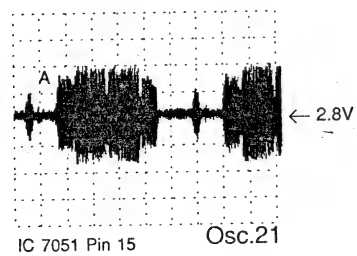
IC 7051 Pin 12 Osc.20
(measured in playback)

A: AC, 50 mV/Div , 5 ms/Div



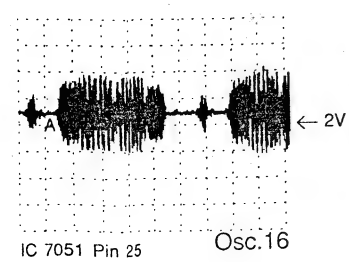
IC 7051 Pin 27 Osc.15
(measured in playback)

A: AC, 0.1 V/Div , 10 us/Div



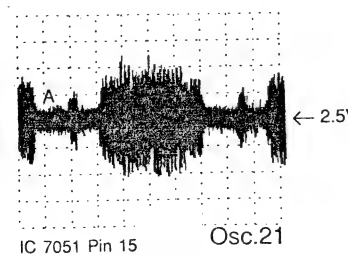
IC 7051 Pin 15 Osc.21

A: DC, 0.5 V/Div , 10 us/Div



IC 7051 Pin 25 Osc.16
(measured in playback)

A: AC, 0.2 V/Div , 10 us/Div

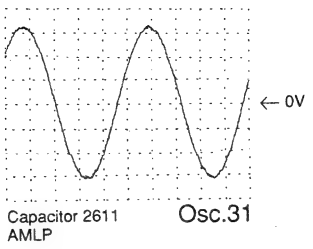


IC 7051 Pin 15 Osc.21
(measured in playback)

OSCILLOGRAMS
AUDIO LINEAR -AL

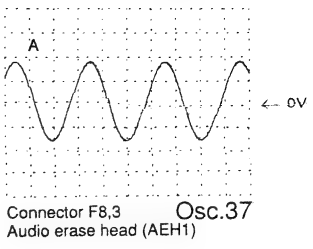
Unless otherwise indicated measured in position record.

A: DC, 0.2 V/Div, 0.2 ms/Div



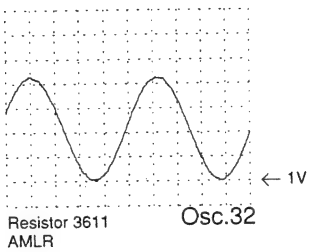
Capacitor 2611 Osc.31
AMLP

A: DC, 20 V/Div, 5 us/Div



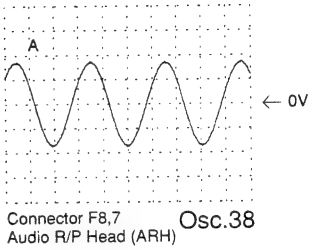
Connector F8,3 Osc.37
Audio erase head (AEH1)

A: DC, 0.2 V/Div, 0.2 ms/Div



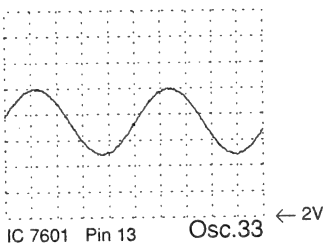
Resistor 3611 Osc.32
AMLR

A: DC, 10 V/Div, 5 us/Div



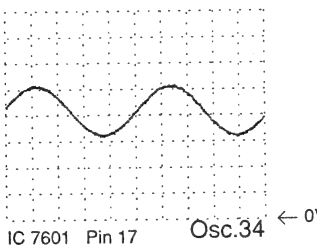
Connector F8,7 Osc.38
Audio R/P Head (ARH)

A: DC, 0.5 V/Div, 0.2 ms/Div



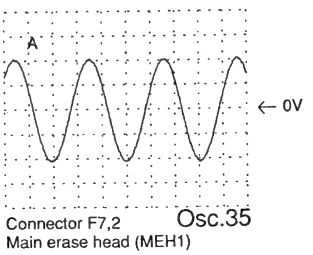
IC 7601 Pin 13 Osc.33

A: DC, 1 V/Div, 0.2 ms/Div



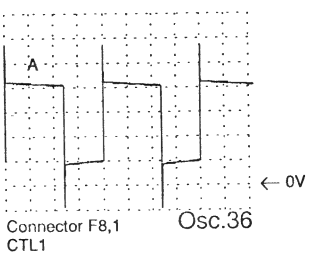
IC 7601 Pin 17 Osc.34

A: DC, 0.1 V/Div, 5 us/Div



Connector F7,2 Osc.35
Main erase head (MEH1)

A: DC, 1 V/Div, 10 ms/Div



Connector F8,1 Osc.36
CTL1

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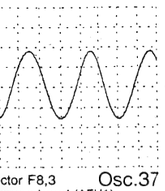
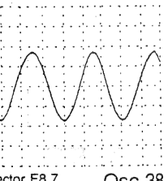
in position record.

20 V/Div, 5 us/Div



ctor F8,3 Osc.37
erase head (AEH1)

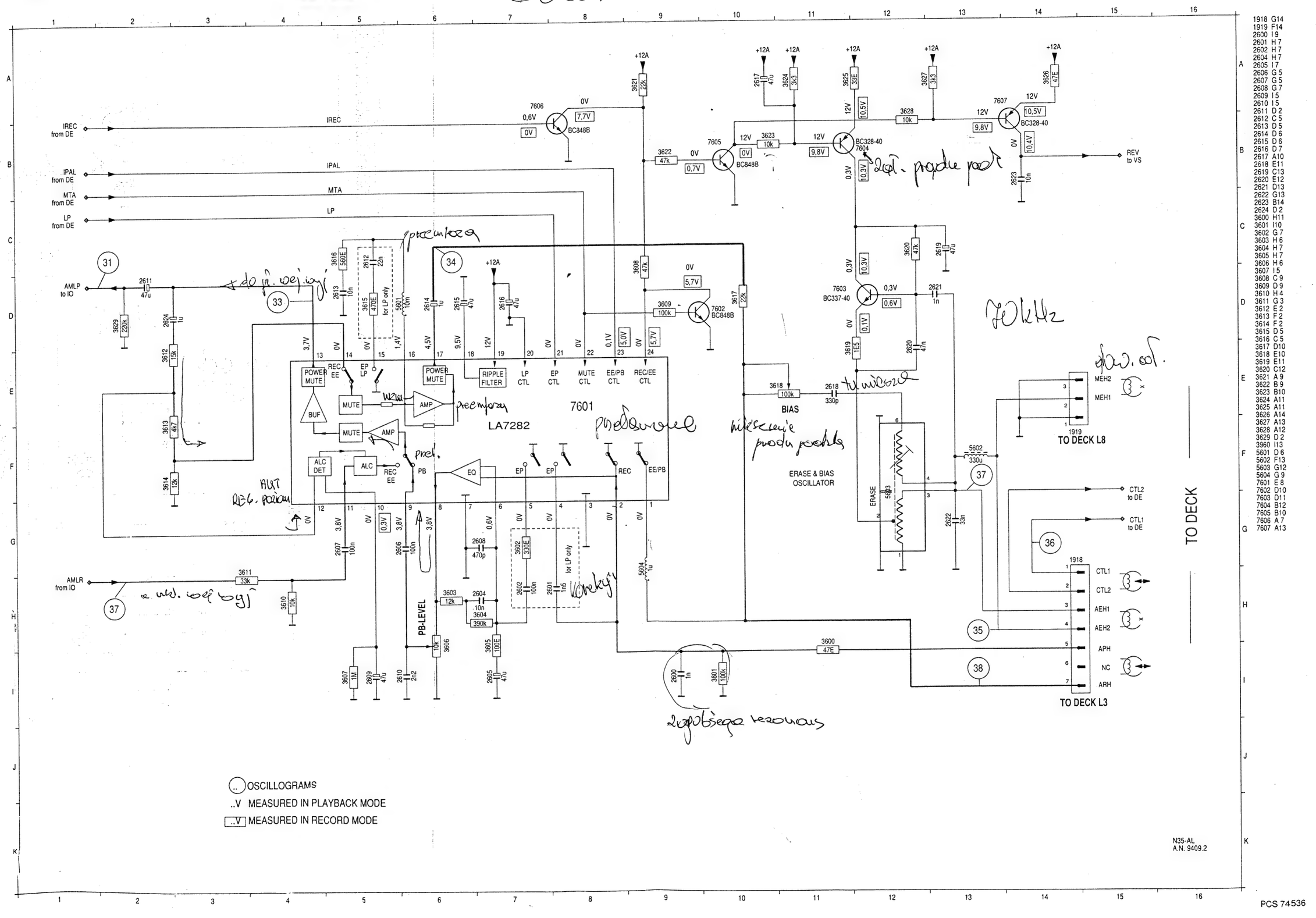
10 V/Div, 5 us/Div



ctor F8,7 Osc.38
R/P Head (ARH)

3-37

FAMILY BOARD AUDIO LINEAR - AL N3 N5



PCS 74536

FAMILY BOARD FRONT END - FV N3 N5

3-38 3-38

* VERSION				
Pos.	PAL-BG	SEC-L	MULTISTD	PAL-I
1701	UV916E	UV916E	UV916E	U944C
1720	G1966M	K3953M	———	J1952M
1740	TRAP 5,5MHz	TRAP 6,5MHz	TRAP 5,5MHz	TRAP 6,0MHz
1745	BP 5,5MHz	———	BP 5,5MHz	BP 6,0MHz
7720	TDA9800	TDA9803	TDA9802	TDA9800
2842	-------	-------	220n	-------
3707	-------	10k	10k	10k
3708	10k	-------	------	10k

for SEC-L and MULTISTANDARD only

delete for MULTISTANDARD

for MULTISTANDARD only

delete for PAL-BG

delete for PAL only

delete for SEC-L

delete for SEC-L only

delete for TXT

for TXT only

delete for TV-VCR kombination

L = 0,0V L = SECAM

H = 3,3V H = PAL

OSCILLOGRAMS

..V MEASURED IN PAL MODE

..V MEASURED IN SECAM MODE

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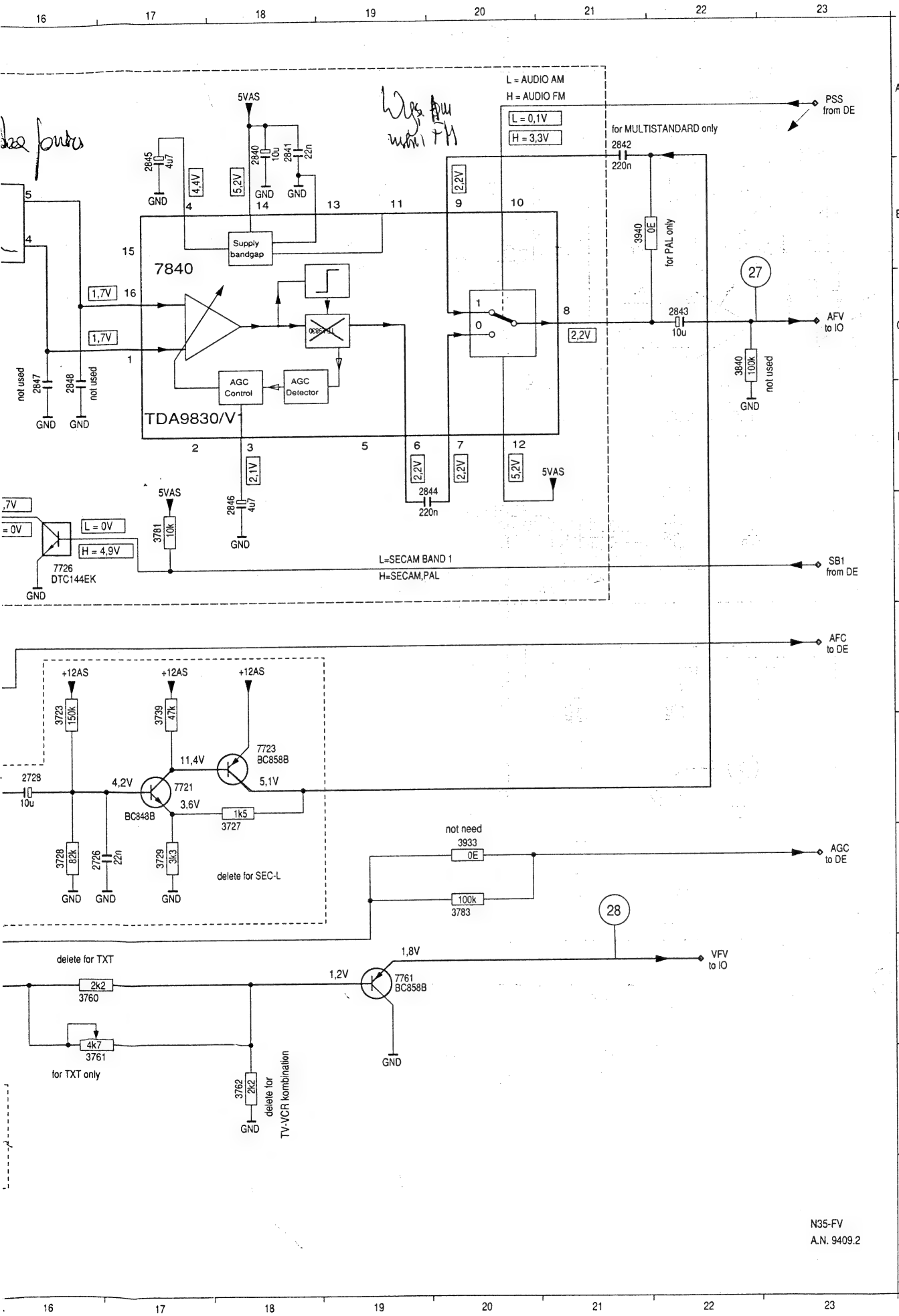
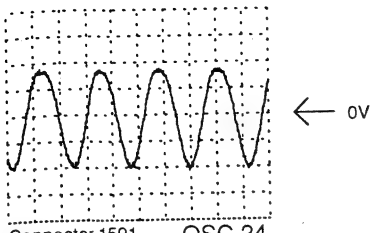


	1701 G 4		6824 B14
	1720 G 8		7720 H13
	1721 H 8		7721 G17
	1740 J13		7723 G18
	1745 J15		7726 E16
	1821 B15		7761 I19
A	2700 K 3		7790 B 7
	2701 K 2		7791 C 7
	2702 F 2		7792 D 8
	2703 F 4		7793 A 7
	2704 K 4		7822 B12
	2705 D 2		7823 E14
	2720 H 6		7824 C15
	2721 I 6		7840 C17
	2722 I 7		
	2723 I 9		
	2724 I 9		
B	2725 F15		
	2726 H16		
	2727 H15		
	2728 G16		
	2733 E15		
	2735 E12		
	2736 D13		
	2737 F11		
	2738 F10		
	2739 F10		
C	2740 J12		
	2741 J12		
	2790 B 7		
	2791 A 9		
	2833 B11		
	2834 B13		
	2840 A18		
	2841 A18		
	2842 A21		
	2843 C22		
D	2844 E19		
	2845 A17		
	2846 E18		
	2847 C16		
	2848 C16		
	3702 J 2		
	3703 J 2		
	3704 J 3		
	3705 K 3		
	3707 K 4		
E	3708 K 4		
	3720 H 7		
	3721 I 7		
	3723 F16		
	3725 E 5		
	3726 F 5		
	3727 H18		
	3728 H16		
	3729 H17		
F	3730 F15		
	3731 F15		
	3734 E14		
	3737 G15		
	3739 F17		
	3741 J 9		
	3742 J10		
	3743 J14		
	3745 J14		
	3748 D15		
	3749 F11		
G	3756 D 8		
	3760 I16		
	3761 J16		
	3762 J18		
	3781 E17		
	3782 J11		
	3783 H20		
	3790 B 6		
	3791 B 6		
	3792 A 6		
H	3795 C 8		
	3796 D 9		
	3797 D 7		
	3798 D 9		
	3799 C 8		
	3825 B11		
	3826 B11		
	3828 C13		
	3829 C13		
	3831 D15		
I	3832 C14		
	3833 A14		
	3834 A14		
	3840 C22		
	3900 F 5		
	3901 K11		
	3904 F13		
	3920 G20		
	3933 H20		
	3940 B21		
J	5700 K 3		
	5701 F 2		
	5720 H 5		
	5721 H 7		
	5724 I 7		
	5725 D11		
	5726 E13		
	5727 F10		
	5728 E14		
	5740 K13		
	6702 F 5		
K	6703 B 8		
	6720 I 7		
	6721 H 7		
	6722 F13		
	6790 B 9		
	6791 B 9		
	6823 B14		

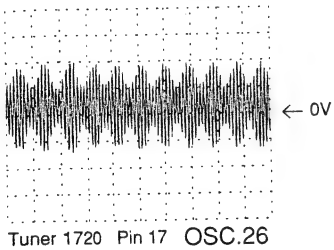
OSCILLOGRAMS FRONT END IN/OUT

A: AC, 20mV/Div, 100ns/Div



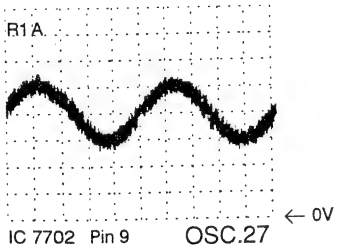
Connector 1591 OSC.24
FSC

A: DC, 0.1 V/Div 0.2 us/Div



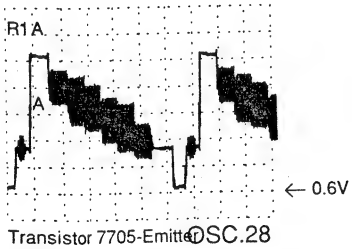
Tuner 1720 Pin 17 OSC.26

A: DC, 0.5 V/Div 0.2 ms/Div



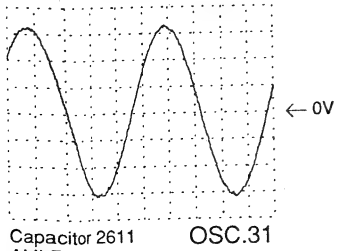
IC 7702 Pin 9 OSC.27
AFV

A: DC, 0.2 V/Div 10 us/Div



Transistor 7705-Emitter OSC.28
VFV

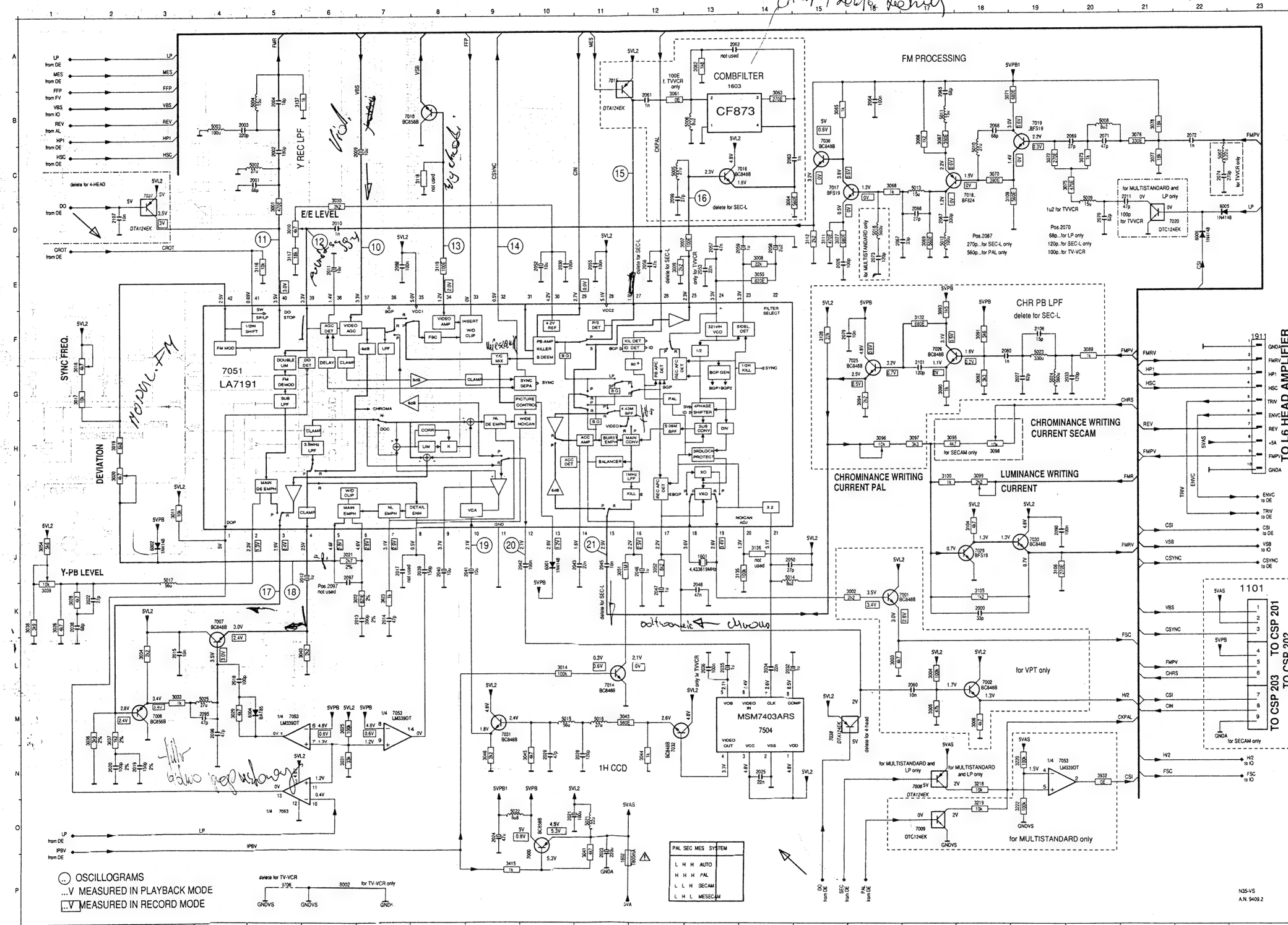
A: DC, 0.2 V/Div, 0.2 ms/Div



Capacitor 2611 OSC.31
AMLP

REMARKS :

FAMILY BOARD VIDEOSIGNALPROCESSING - VS N3 N5



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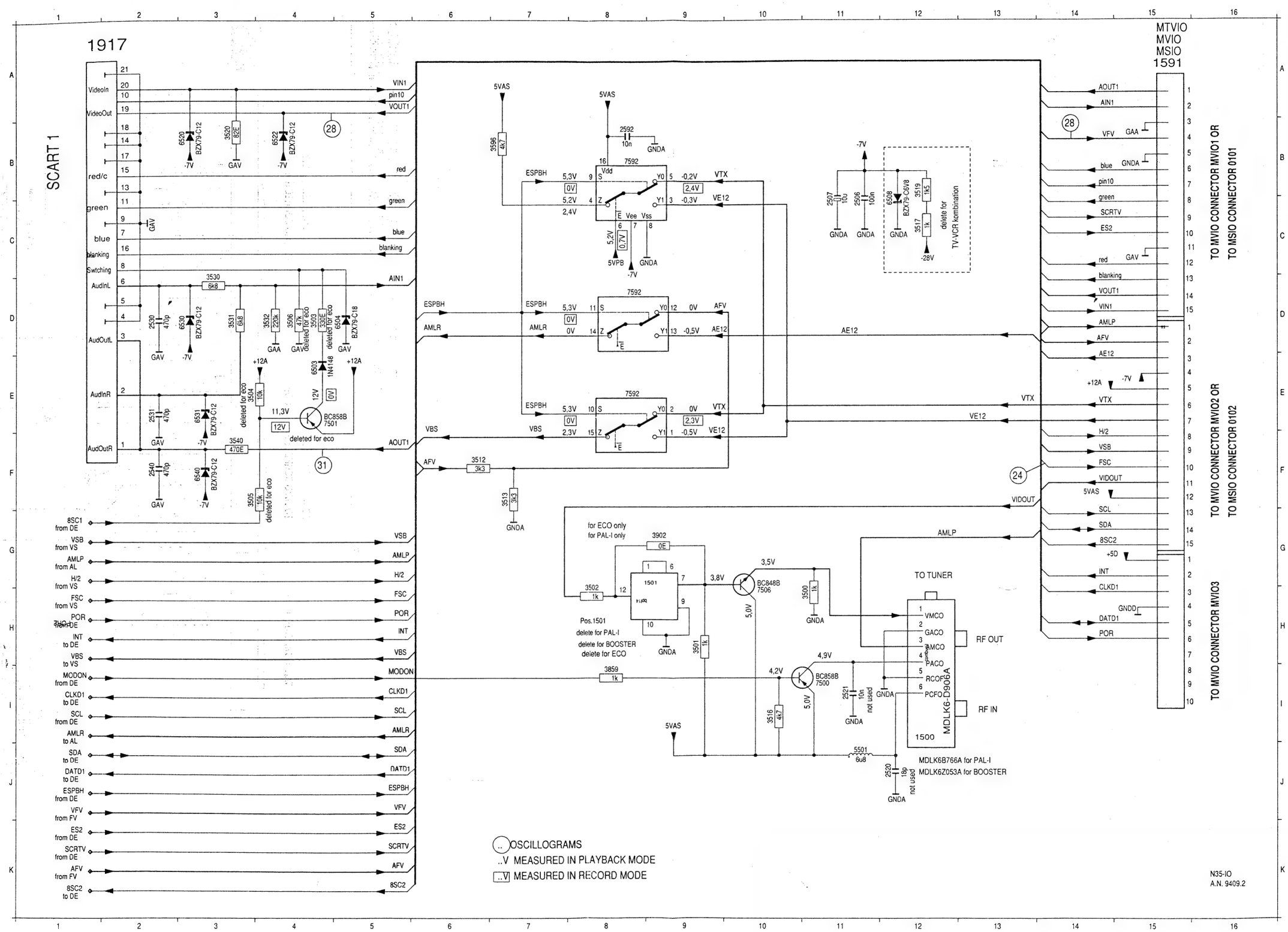
FAMILY BOARD IN/OUT - I/O N3 N5



PCS 74538

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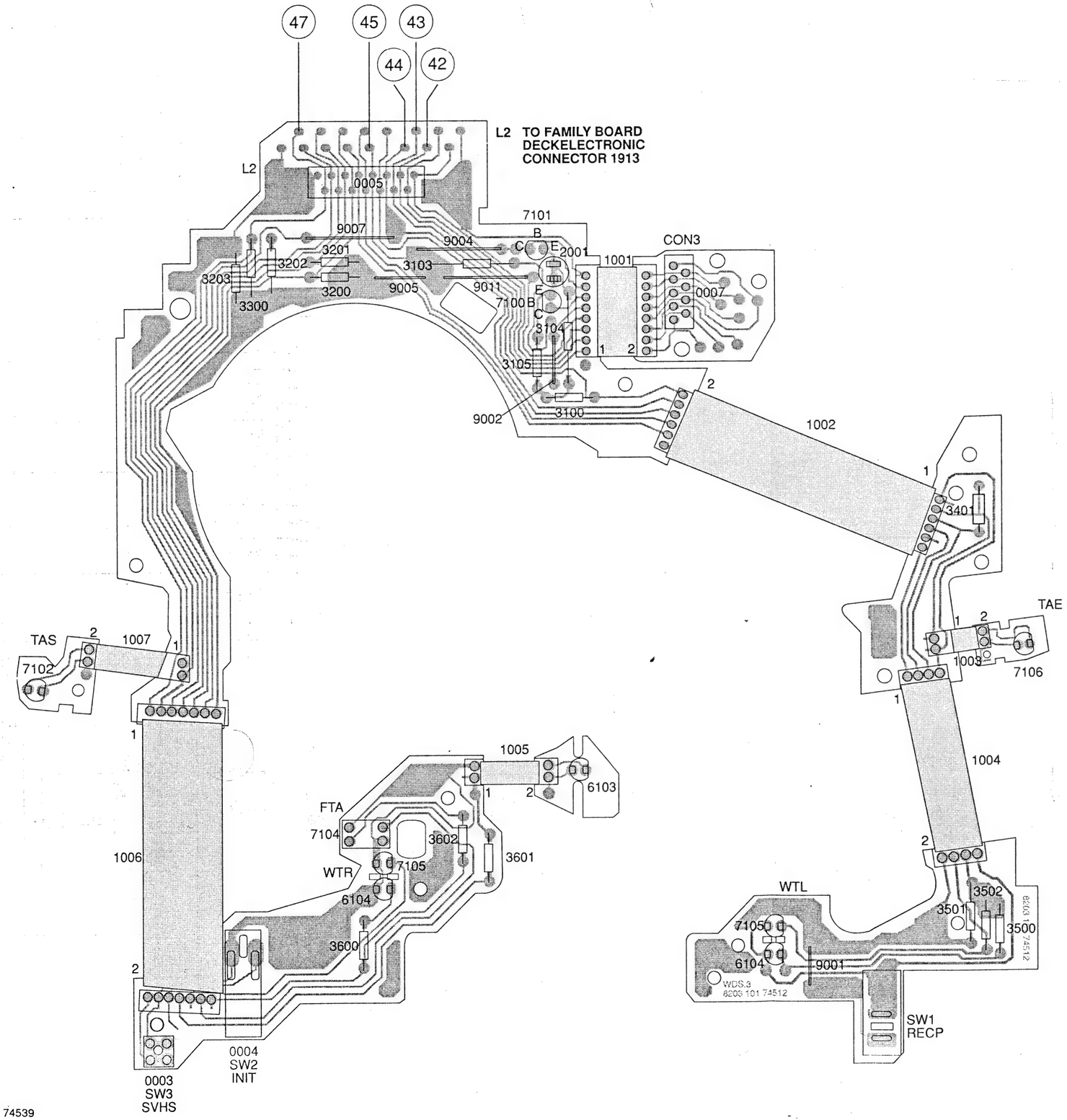
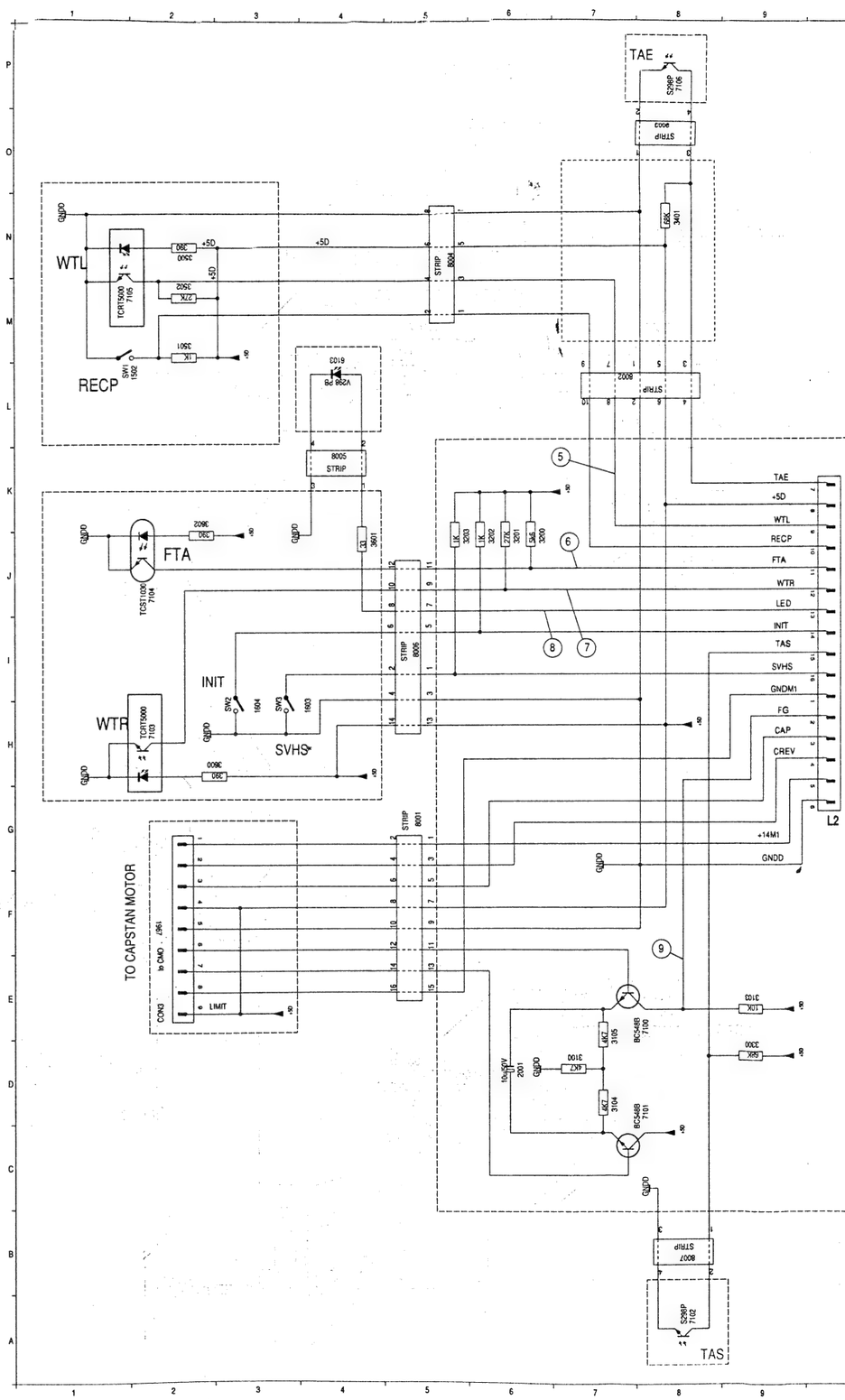
TAPE DECK SENSOR BOARD

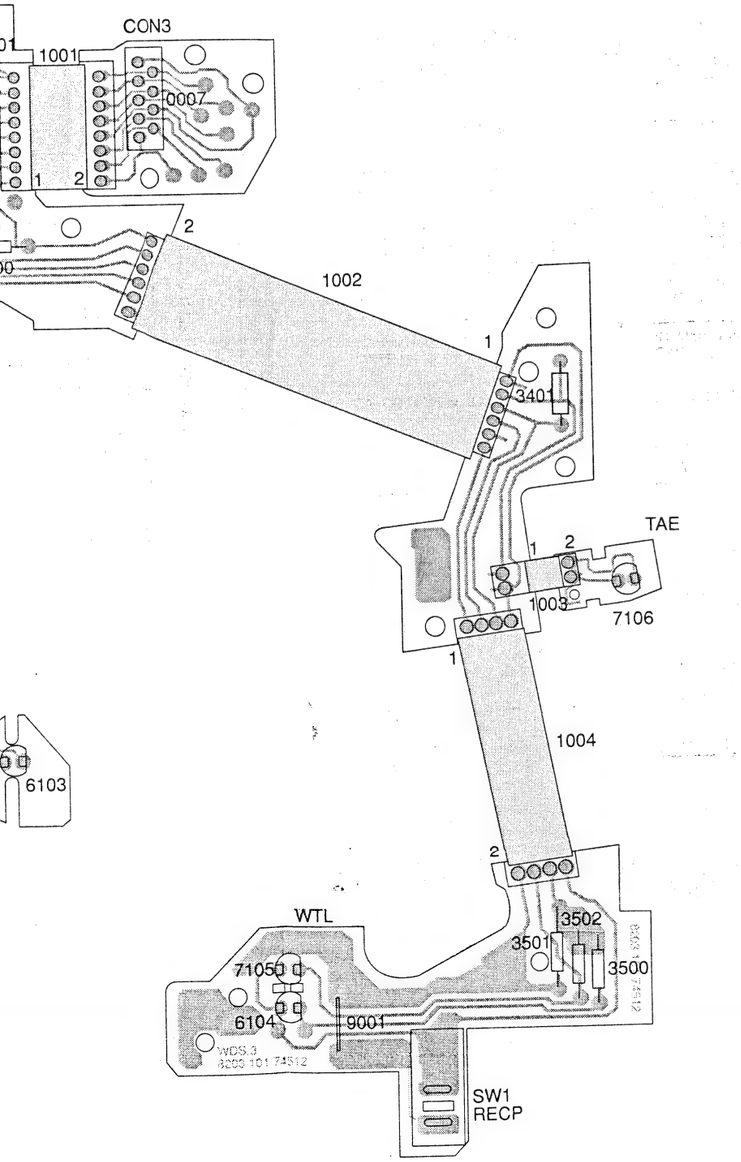


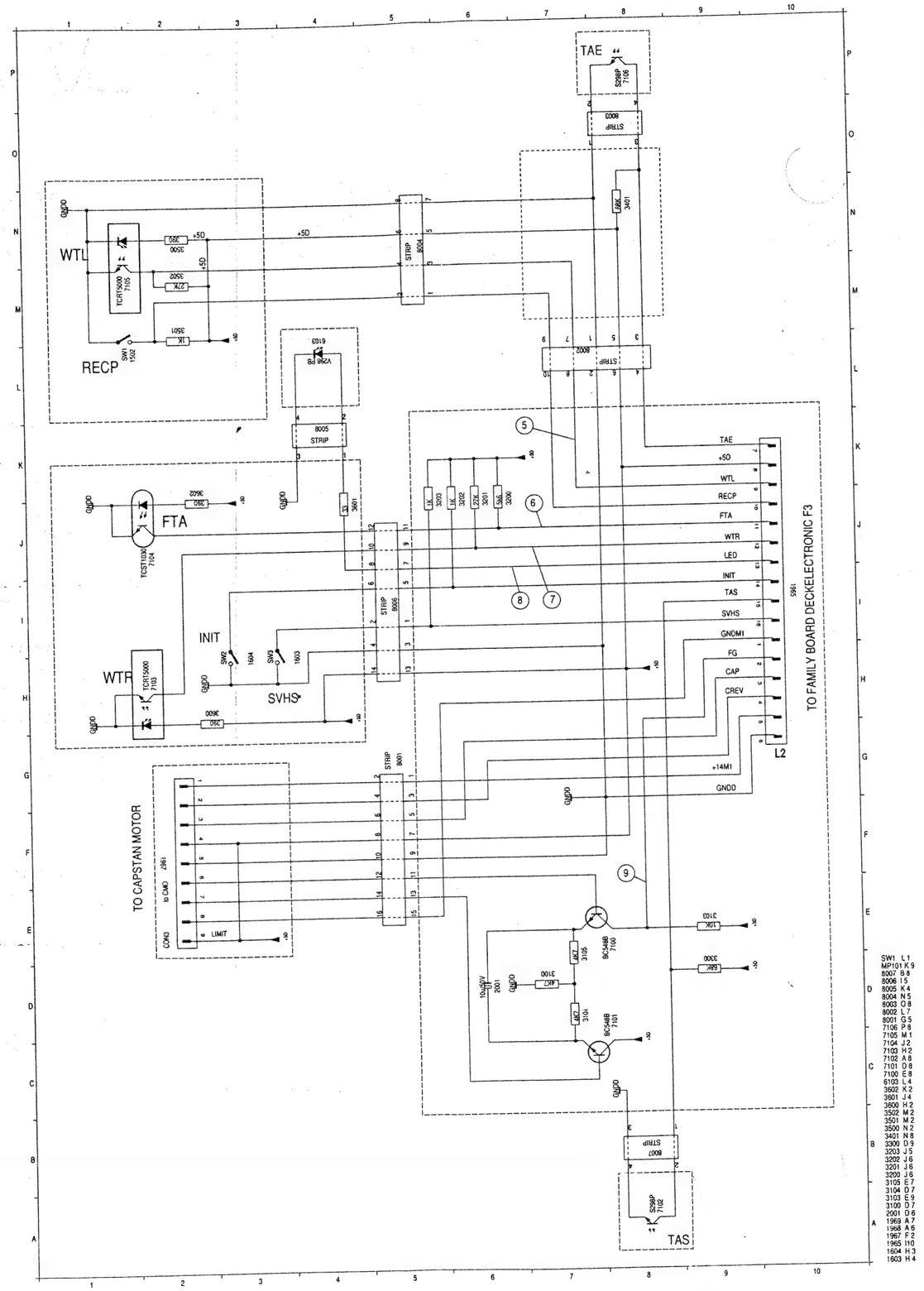


PCS 74539

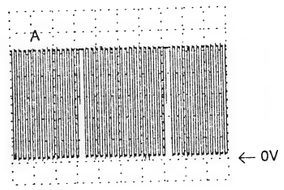
3-40

LY BOARD
ECTRONIC
TOR 1913



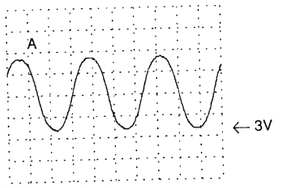


A: DC, 1 V/Div, 10 ms/Div



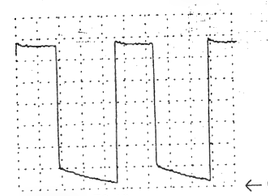
Connector F4,1
PG/FG

A: AC, 0.5 V/Div, 0.2 ms/Div



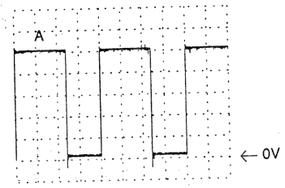
Connector F3,2
FG

A: DC, 0.5 V/Div, 0.5 ms/Div



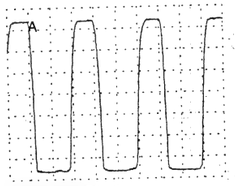
Connector F3,13
LED

A: DC, 1 V/Div, 10 ms/Div



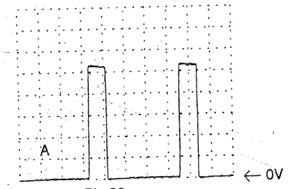
IC 7411 Pin 2
CTL1 REC

A: DC, 0.5 V/Div, 2 ms/Div



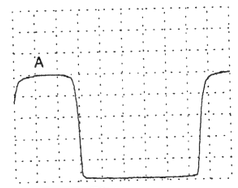
Connector F3,12
WTR Wind

A: DC, 1 V/Div, 10 us/Div



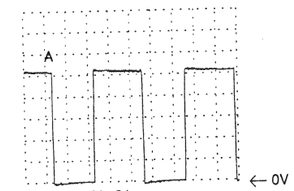
IC 7410 Pin 30
CAP

A: DC, 1 V/Div, 2 ms/Div



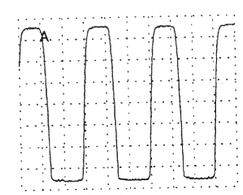
Connector F3,11
FTA Threading

A: DC, 1 V/Div, 10 us/Div



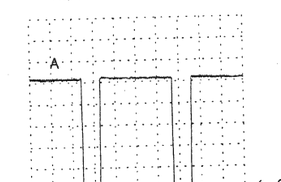
IC 7410 Pin 31
REEL

A: DC, 0.5 V/Div, 2 ms/Div



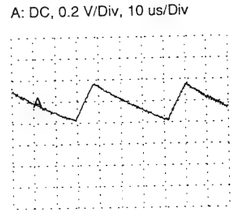
Connector F3,9
WTL Wind

A: DC, 1 V/Div, 10 us/Div



IC 7410 Pin 32
THIO

A: DC, 0.2 V/Div, 10 us/Div



Connector F3,3
CAP

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FAMILY BOARD DECKELECTRONIC - DE N3 N5

TO DECK L4 THREADING MOTOR

TO DECK L2 SENSOR PRINT

TVC 7410 TMP91X642N

7411 SAA1310

CAPSTAN SUPPLY SWITCH

EEPROM ST24C02A

	3464	3488
for other	10K	/
for Pal-I	10k	82k
for Sec-LP	/	10k

IN CASE OF REPLACEMENT MAKE ADJUSTMENT FOR GAP POSITION AND TUNING LIMITS (SEE FAMILY BOARD ADJUSTMENT) AND PROGRAMMING OF THE FEATURE CODE (SEE SERVICE TEST PROGRAMM)

..) OSCILLOGRAMS
..V MEASURED IN PLAYBACK MODE
[..V] MEASURED IN RECORD MODE

TO DC1 OPERATING PANEL

TO SM111 POWER SUPPLY

TO L1 HEAD AMPLIFIER

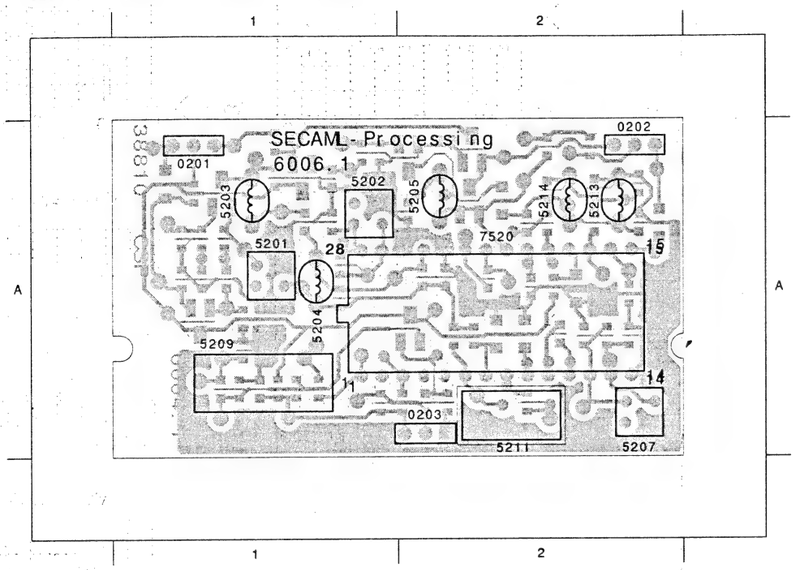
to/from FV

N35-DE
A.N. 9409.2

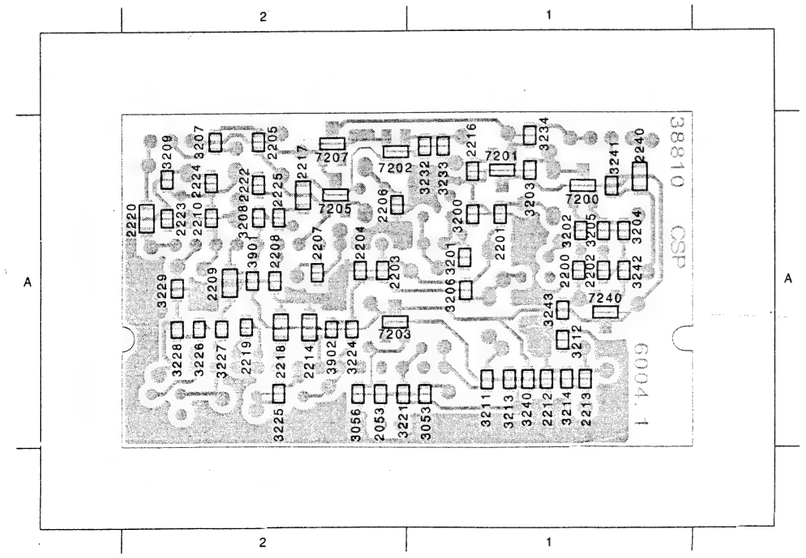
PCS 74540

CHROMA SIGNAL SECAM PROCESSING BOARD CSP N3 N5

0201 A 1 0203 A 2 5202 A 1 5204 A 1 5207 A 2 5211 A 2 5214 A 2
0202 A 2 5201 A 1 5203 A 1 5205 A 2 5209 A 1 5213 A 2 7520 A 2



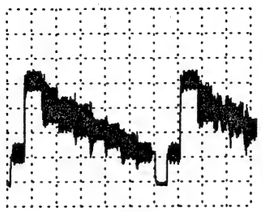
2053 A 2 2209 A 2 2222 A 2 3203 A 1 3214 A 1 3234 A 1 7203 A 2
2200 A 1 2210 A 2 2223 A 2 3204 A 1 3221 A 2 3240 A 1 7205 A 2
2201 A 1 2212 A 1 2224 A 2 3205 A 1 3224 A 2 3241 A 1 7207 A 2
2202 A 1 2213 A 1 2225 A 2 3206 A 1 3225 A 2 3242 A 1 7240 A 1
2203 A 2 2214 A 2 2240 A 1 3207 A 2 3226 A 2 3243 A 1
2204 A 2 2216 A 1 3053 A 1 3208 A 2 3227 A 2 3901 A 2
2205 A 2 2217 A 2 3056 A 2 3209 A 2 3228 A 2 3902 A 2
2206 A 2 2218 A 2 3200 A 1 3211 A 1 3229 A 2 7200 A 1
2207 A 2 2219 A 2 3201 A 1 3212 A 1 3232 A 1 7201 A 1
2208 A 2 2220 A 2 3202 A 1 3213 A 1 3233 A 1 7202 A 2



PCS 74541

OSCILLOGRAMS CHROMA SECAM PRINT CSP

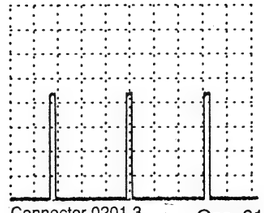
A: DC, 200mV/Div, 10us/Div



← 2V

Connector 0201,1 VBS — Osc. 60

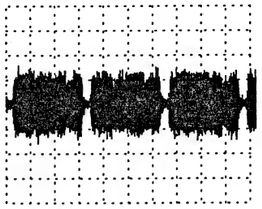
A: DC, 1 V/Div, 20us/Div



← 0V

Connector 0201,3 CSYNC — Osc. 61

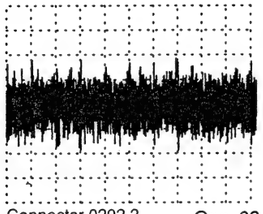
A: AC, 50mV/Div, 20us/Div



← 2.6V

IC 7520,25 — Osc. 62

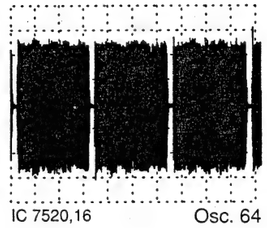
A: AC, 100mV/Div, 20ms/Div



← 2.8V

Connector 0202,2 FMPV — Osc. 63

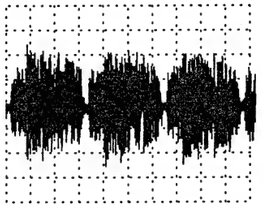
A: AC, 100mV/Div, 20us/Div



← 1.3V

IC 7520,16 — Osc. 64

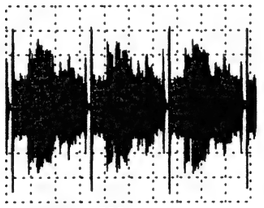
A: AC, 200mV/Div, 20us/Div



← 1.8V

IC 7520,1 — Osc. 65

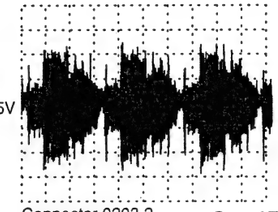
A: AC, 100mV/Div, 20us/Div



← 0.75V

Connector 0202,3 CHRS — Osc. 66

A: AC, 50mV/Div, 20us/Div



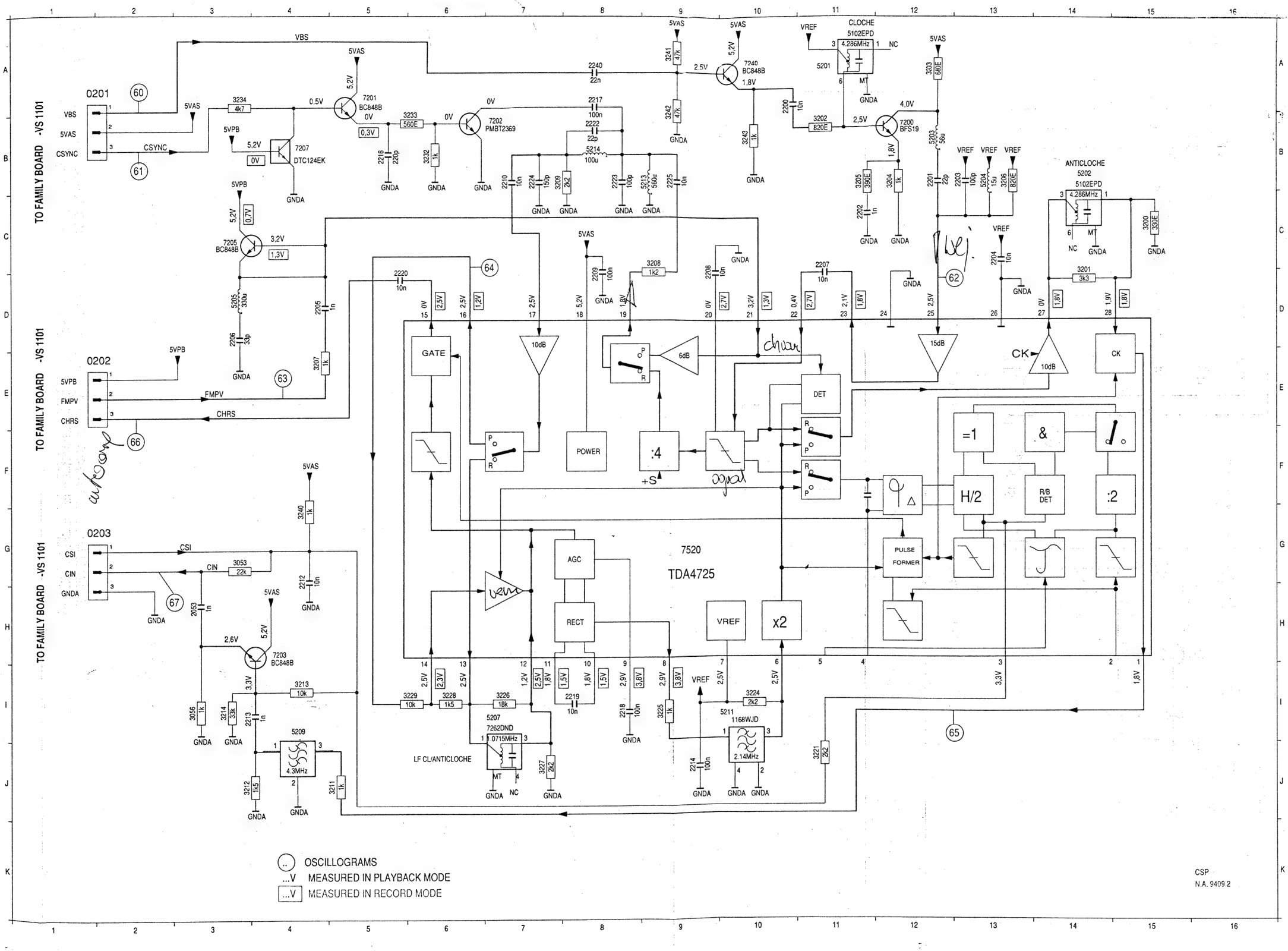
← 2.7V

Connector 0203,2 CIN — Osc. 67

REMARKS :

3-43

CHROMA SIGNAL SECAM PROCESSING BOARD CSP N3 N5

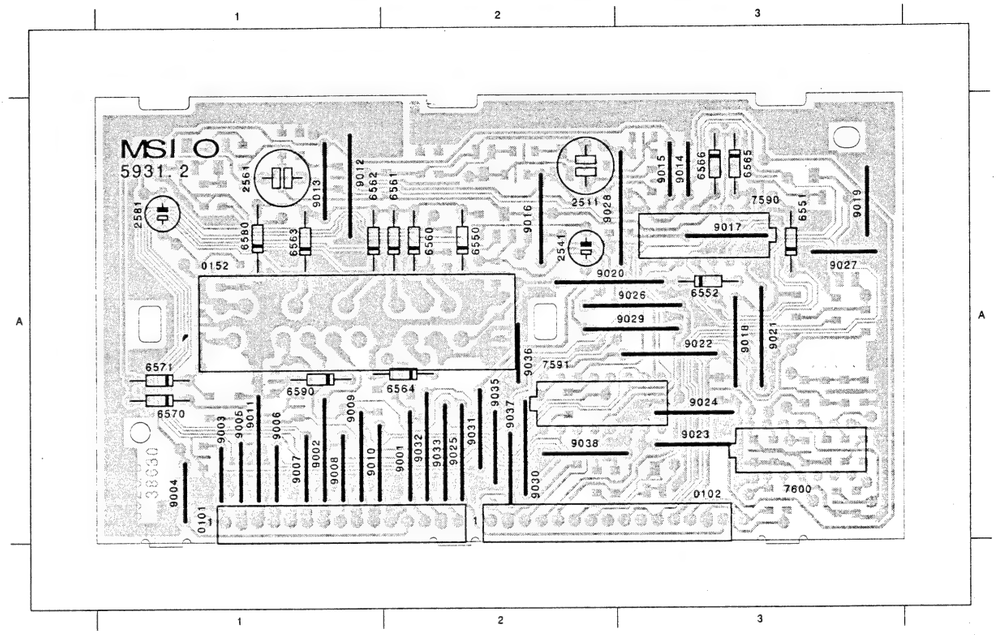


0201 A 2
0202 G 2
2053 H 3
2200 A10
2201 B12
2202 C11
2203 B13
2204 C13
2205 D 4
2206 D 3
2207 C11
2208 D 9
2209 D 8
2210 B 7
2212 G 4
2213 I 3
2214 J 9
2216 B 5
2217 A 8
2218 I 8
2219 I 8
2220 D 5
2222 B 8
2223 B 8
2224 B 7
2225 B 9
2240 A 8
3053 G 3
3056 I 3
3200 C15
3201 D14
3202 B11
3203 A12
3204 B12
3205 B11
3206 B13
3207 E 4
3208 C 9
3209 B 7
3211 J 5
3212 J 3
3213 I 4
3214 I 3
3221 J11
3224 I10
3225 I 9
3226 I 7
3227 J 7
3228 I 6
3229 I 6
3232 B 6
3233 B 6
3234 A 3
3240 G 4
3241 A 9
3242 A 9
3243 B10
5201 A11
5202 B14
5203 B12
5204 B13
5205 D 3
5207 I 7
5209 I 4
5211 I10
5213 B 9
5214 B 8
7200 B12
7201 A 5
7202 B 7
7203 H 4
7205 C 3
7207 B 4
7240 A10
7520 G 9

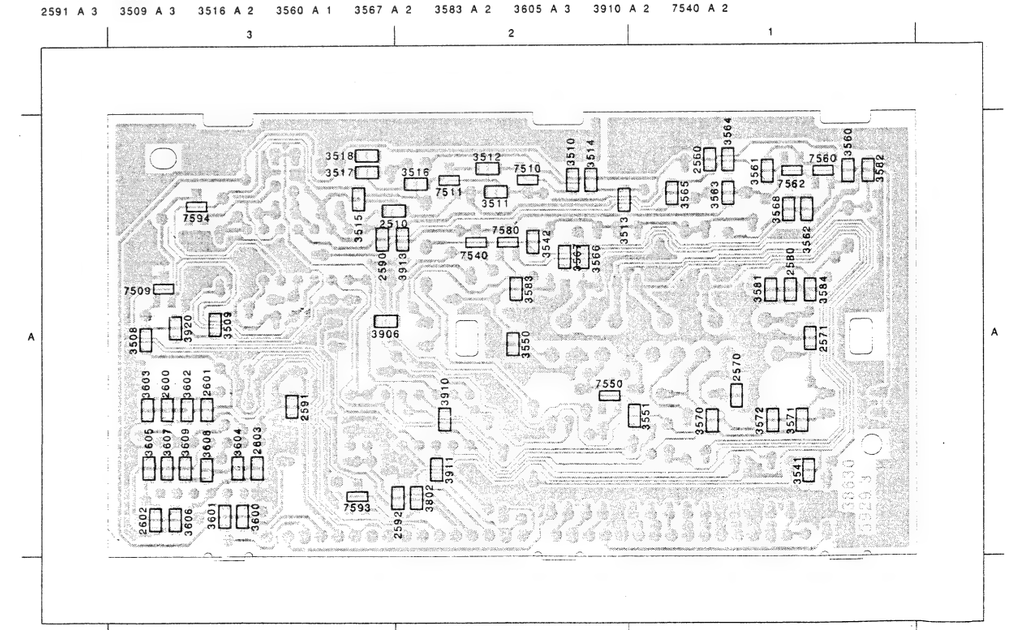
REMARKS :

SCART2, IN/OUT, VPS BOARD MSIO, MSIO/VPS

0101 A 1	2581 A 1	6562 A 1	6571 A 1	9001 A 2	9007 A 1	9013 A 1	9019 A 3	9025 A 2	9031 A 2	9038 A 2
0102 A 2	6550 A 2	6563 A 1	6580 A 1	9002 A 1	9008 A 1	9014 A 3	9020 A 2	9026 A 3	9032 A 2	
0152 A 1	6551 A 3	6564 A 2	6590 A 1	9003 A 1	9009 A 1	9015 A 3	9021 A 3	9027 A 3	9033 A 2	
2511 A 2	6552 A 3	6565 A 3	7590 A 3	9004 A 1	9010 A 1	9016 A 2	9022 A 3	9028 A 3	9035 A 2	
2541 A 2	6560 A 2	6566 A 3	7591 A 2	9005 A 1	9011 A 1	9017 A 3	9023 A 3	9029 A 3	9036 A 2	
2561 A 1	6561 A 2	6570 A 1	7600 A 3	9006 A 1	9012 A 1	9018 A 3	9024 A 3	9030 A 2	9037 A 2	



2510 A 3	2592 A 2	3510 A 2	3517 A 3	3561 A 1	3568 A 1	3584 A 1	3606 A 3	3911 A 2	7550 A 2
2560 A 1	2600 A 3	3511 A 2	3518 A 3	3562 A 1	3570 A 1	3600 A 3	3607 A 3	3913 A 2	7560 A 1
2570 A 1	2601 A 3	3512 A 2	3541 A 1	3563 A 1	3571 A 1	3601 A 3	3608 A 3	3920 A 3	7562 A 1
2571 A 1	2602 A 3	3513 A 2	3542 A 2	3564 A 1	3572 A 1	3602 A 3	3609 A 3	7509 A 3	7580 A 2
2580 A 1	2603 A 3	3514 A 2	3550 A 2	3565 A 1	3581 A 1	3603 A 3	3802 A 2	7510 A 2	7593 A 3
2590 A 3	3508 A 3	3515 A 3	3551 A 1	3566 A 2	3582 A 1	3604 A 3	3906 A 3	7511 A 2	7594 A 3
2591 A 3	3509 A 3	3516 A 2	3560 A 1	3567 A 2	3583 A 2	3605 A 3	3910 A 2	7540 A 2	



SCART2, IN/OUT, VPS BOARD MSIO, MSIO/VPS N3 N5

SCART 2 ,
SCRAMBLE
0152

VPS-Option

7600 SDA5642

TI PD1 INUL VCO IREF FBAS UDD

SHIFTREGISTER PICKOUT UNIT DATA DETECTION OF 16. LINE I2C-BUS INTERFACE

EHB DAVN VCS CSO SDA SCL USS

POS 2560
NOT USED

7590 HEF4053BP

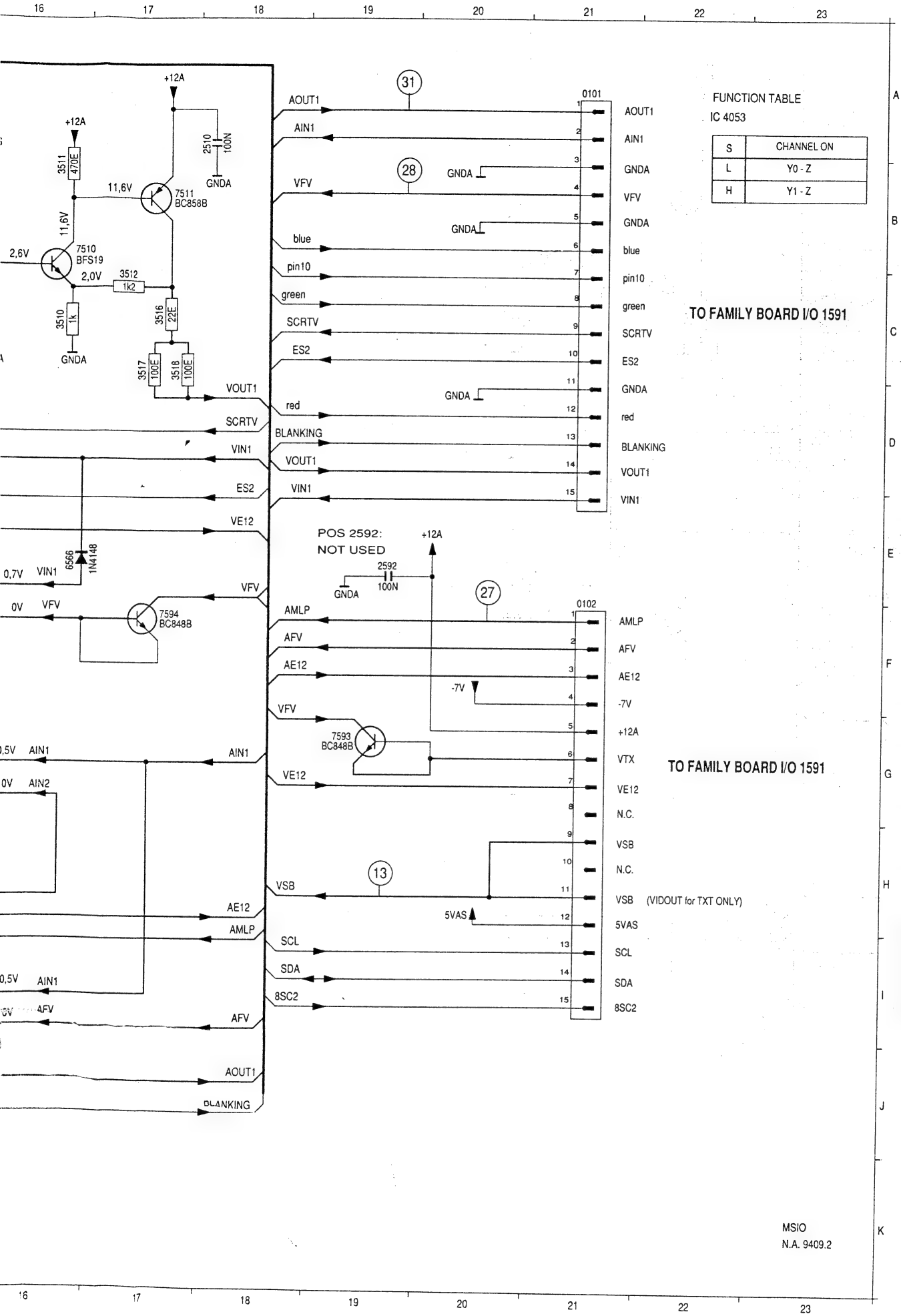
7591 HEF4053BP

7562 BC858B 7511 BC858B 7510 BFS19 7560 BFS19 7550 BC818-40 7580 BC848B 7540 BC848B 7594 BC848B

VOUT1 SCRTV VIN1 ES2 VE12 VFV AIN1 AE12 AMLP AFV AOUT1 BLANKING

...V MEASURED IN PLAYBACK MODE

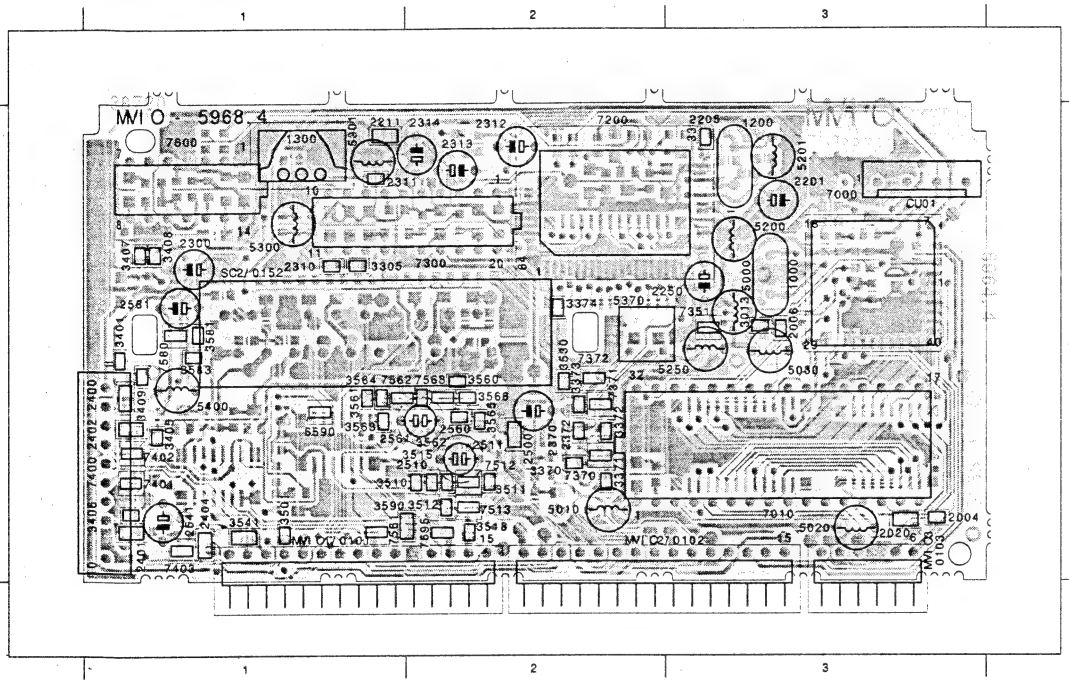
(..) OSCILLOGRAMS



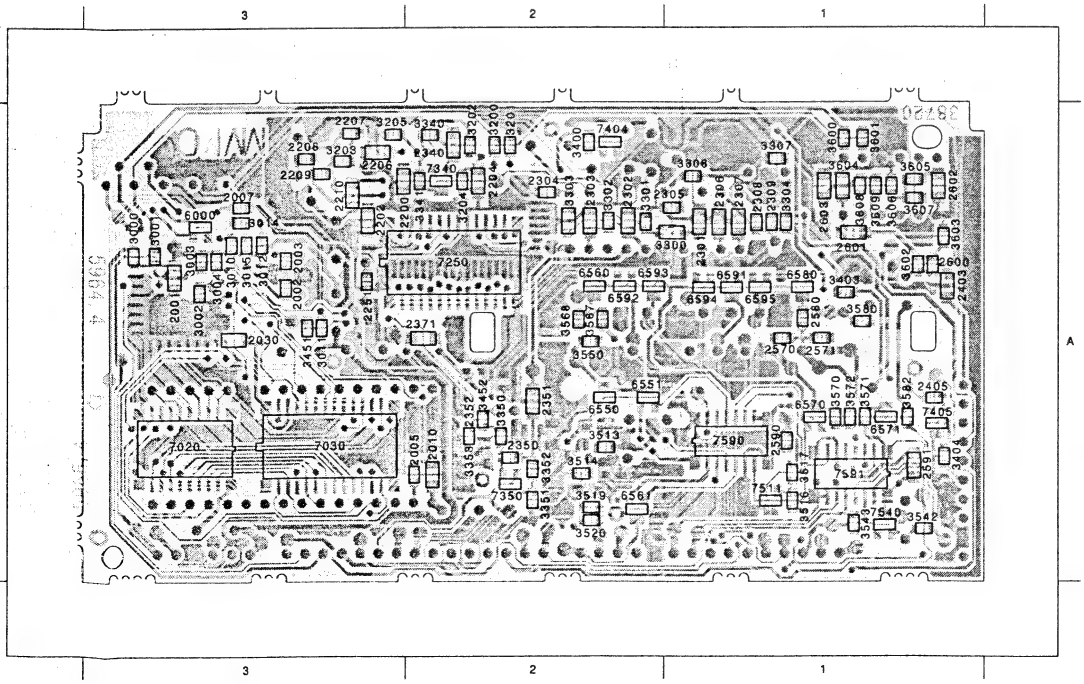
0101 A21
0102 F21
0152 E 1
2510 A18
2511 B15
2541 J13
2560 E 5
2561 F 8
2570 H 2
2571 J 2
2580 K 2
2581 K 4
2590 B14
2591 F15
2592 E19
2600 B 4
2601 B 4
2602 C 5
2603 C 6
3508 A12
3509 A12
3510 C16
3511 B16
3512 C17
3513 B15
3514 C15
3515 B15
3516 C17
3517 C17
3518 C17
3541 J13
3542 J12
3550 E 4
3551 H 8
3560 G 6
3561 E 7
3562 F 6
3563 F 8
3564 G 8
3565 F 9
3566 E 5
3567 F 5
3568 F 5
3570 H 3
3571 I 3
3572 J 3
3581 K 3
3582 K 4
3583 K 5
3584 K 3
3600 B11
3601 B11
3602 B 4
3603 B 4
3604 C 4
3605 C 5
3606 C 5
3607 B 5
3608 B 5
3609 B 6
6550 E 4
6551 E10
6552 D 9
6560 F 3
6561 F 4
6562 G 4
6563 G 4
6564 H 4
6565 D15
6566 E16
6570 H 3
6571 J 3
6580 K 2
6590 H 3
7509 B12
7510 B16
7511 B17
7540 I12
7550 H 7
7560 F 7
7562 F 6
7580 J 4
7590 B13
7590 D12
7590 E15
7591 G15
7591 I10
7591 I15
7593 G19
7594 F17
7600 B 7

SCART2, IN/OUT, VPS, TXT BOARD MVIO

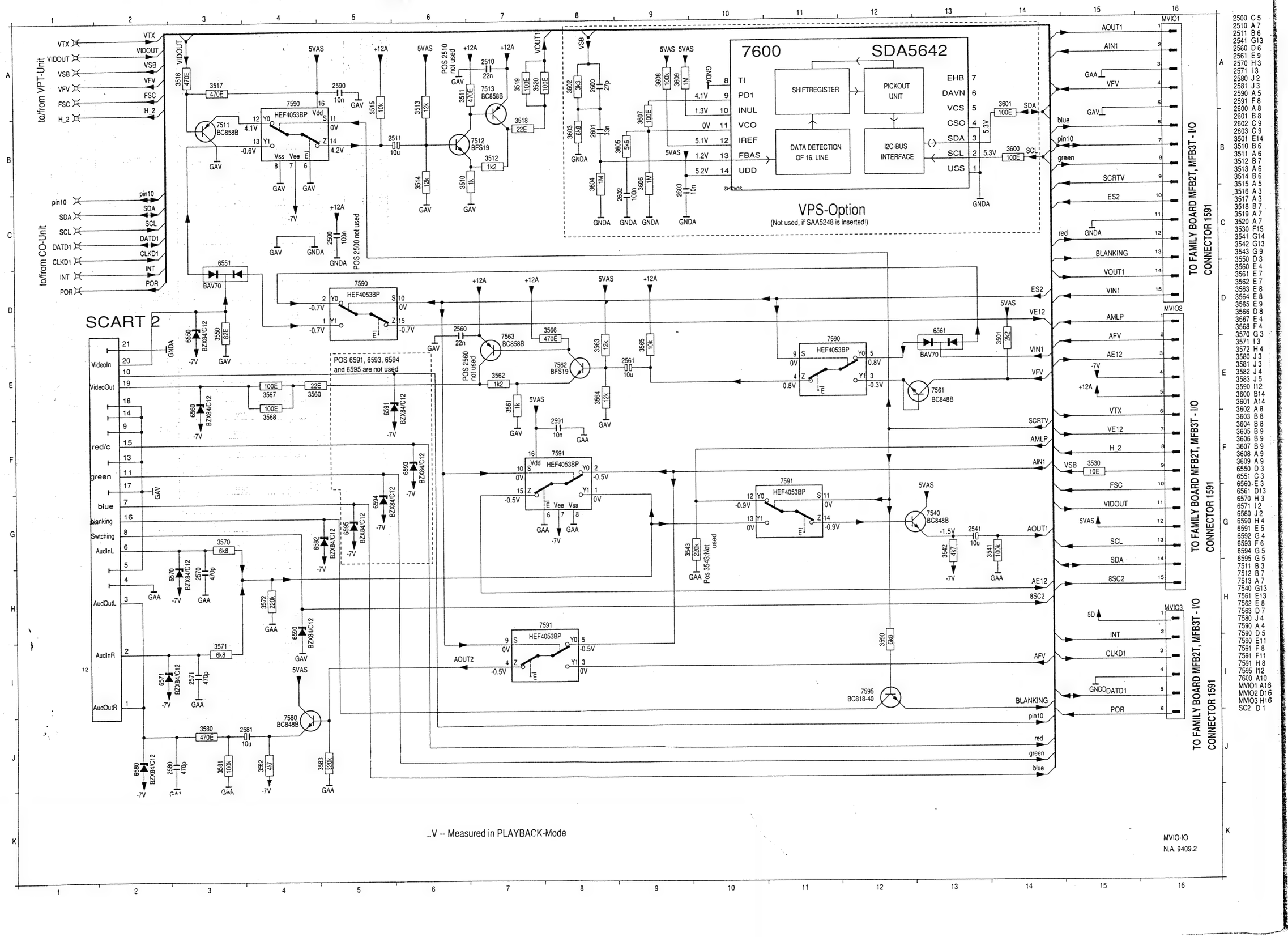
1000 A 3	2300 A 1	2402 A 1	3305 A 1	3408 A 1	3560 A 2	5000 A 3	5400 A 1	7400 A 1	7595 A 2
1200 A 3	2310 A 1	2404 A 1	3370 A 2	3409 A 1	3561 A 1	5010 A 2	6590 A 1	7401 A 1	7600 A 1
1300 A 1	2311 A 1	2500 A 2	3371 A 2	3501 A 1	3562 A 2	5020 A 3	7000 A 3	7402 A 1	CU01 A 3
2004 A 3	2312 A 2	2510 A 2	3372 A 2	3510 A 2	3563 A 1	5030 A 3	7010 A 3	7403 A 1	MVI O1 A 1
2006 A 3	2313 A 2	2511 A 2	3373 A 2	3511 A 2	3564 A 1	5200 A 3	7200 A 2	7512 A 2	MVI O2 A 2
2020 A 3	2314 A 2	2541 A 1	3374 A 2	3512 A 2	3565 A 2	5201 A 3	7300 A 2	7513 A 2	MVI O3 A 3
2201 A 3	2370 A 2	2560 A 2	3401 A 1	3515 A 2	3566 A 2	5250 A 3	7351 A 3	7561 A 1	SC2 A 1
2205 A 3	2372 A 2	2561 A 2	3405 A 1	3518 A 2	3581 A 1	5300 A 1	7370 A 2	7562 A 1	
2211 A 1	2400 A 1	2581 A 1	3406 A 1	3530 A 2	3583 A 1	5301 A 1	7371 A 2	7563 A 2	
2250 A 3	2401 A 1	3013 A 3	3407 A 1	3541 A 1	3590 A 2	5370 A 2	7372 A 2	7580 A 1	



2001 A 3	2208 A 3	2309 A 1	2591 A 1	3012 A 3	3303 A 2	3404 A 1	3567 A 2	3605 A 1	6580 A 1	7405 A 1
2002 A 3	2209 A 3	2340 A 2	2600 A 1	3014 A 3	3304 A 1	3451 A 3	3568 A 2	3606 A 1	6591 A 1	7511 A 1
2003 A 3	2210 A 3	2350 A 2	2601 A 1	3015 A 3	3306 A 1	3452 A 2	3570 A 1	3607 A 1	6592 A 2	7540 A 1
2005 A 2	2251 A 3	2351 A 2	2602 A 1	3200 A 2	3307 A 1	3513 A 2	3571 A 1	3608 A 1	6593 A 2	7590 A 1
2007 A 3	2301 A 1	2352 A 2	2603 A 1	3201 A 2	3340 A 2	3514 A 2	3572 A 1	3609 A 1	6594 A 1	7591 A 1
2010 A 2	2302 A 2	2371 A 2	3000 A 3	3202 A 2	3341 A 2	3516 A 1	3580 A 1	6000 A 3	6595 A 1	
2030 A 3	2303 A 2	2403 A 1	3001 A 3	3203 A 3	3350 A 2	3517 A 1	3582 A 1	6550 A 2	7020 A 3	
2200 A 3	2304 A 2	2405 A 1	3002 A 3	3204 A 2	3351 A 2	3519 A 2	3600 A 1	6551 A 2	7030 A 3	
2202 A 3	2305 A 1	2570 A 1	3003 A 3	3205 A 3	3352 A 2	3520 A 2	3601 A 1	6560 A 2	7250 A 2	
2204 A 2	2306 A 1	2571 A 1	3004 A 3	3300 A 1	3353 A 2	3542 A 1	3602 A 1	6561 A 2	7340 A 2	
2206 A 3	2307 A 1	2580 A 1	3010 A 3	3301 A 2	3400 A 2	3543 A 1	3603 A 1	6570 A 1	7350 A 2	
2207 A 3	2308 A 1	2590 A 1	3011 A 3	3302 A 2	3403 A 1	3550 A 2	3604 A 1	6571 A 1	7404 A 2	



SCART2, IN/OUT, VPS, TXT BOARD MVIO-I/O-unit N3 N5



..V -- Measured in PLAYBACK-Mode

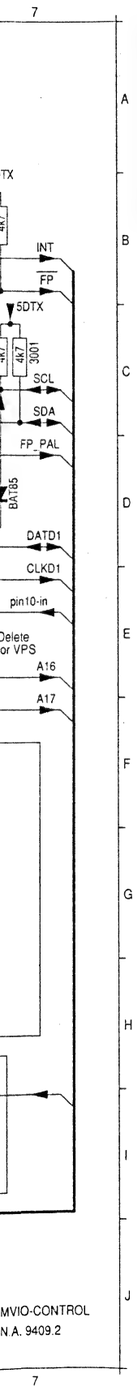
MVIO-IO
N.A. 9409.2

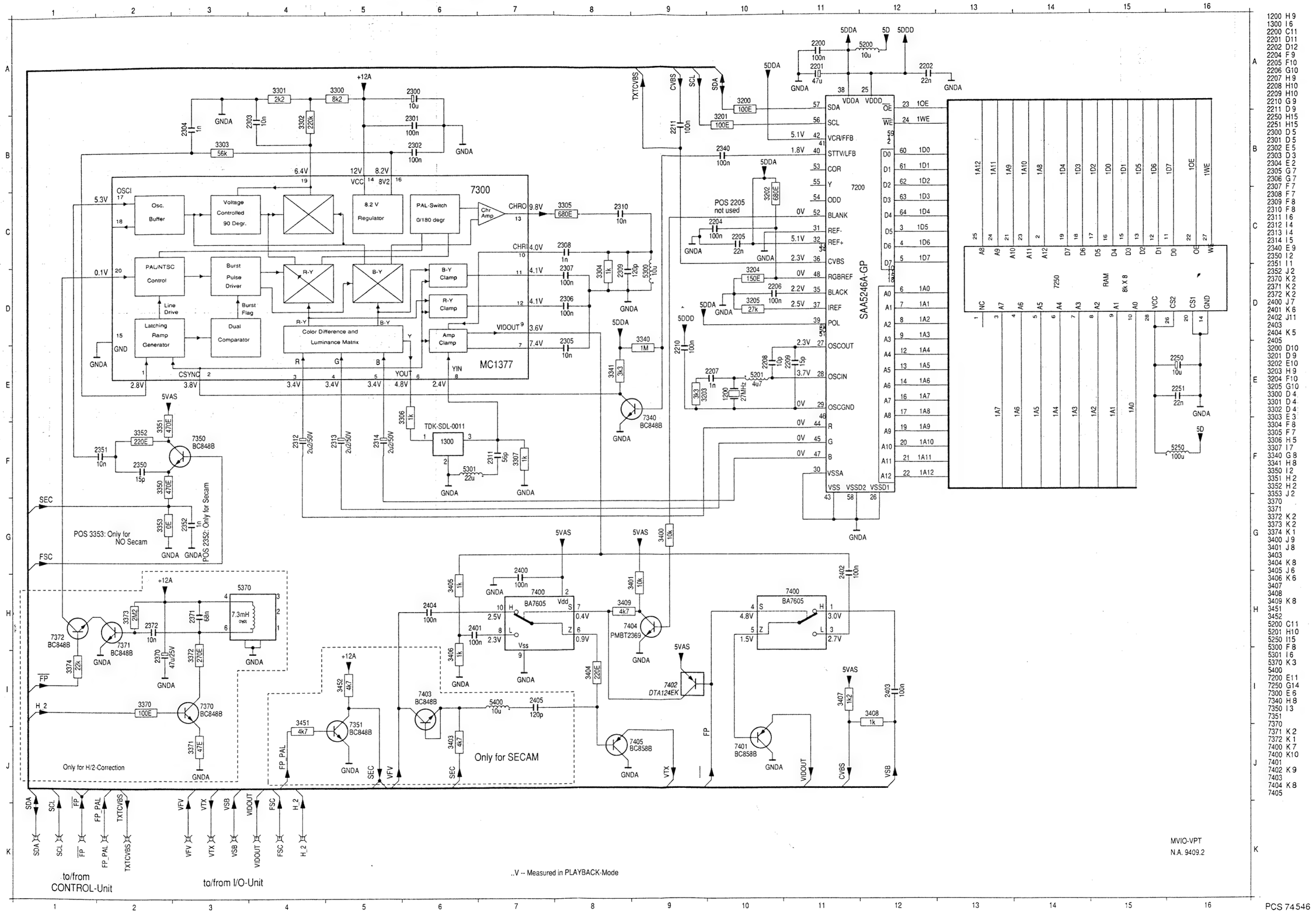
2500 C 5
2510 A 7
2511 B 6
2541 G13
2560 D 6
2561 E 9
2570 H 3
2571 I 3
2580 J 2
2581 J 3
2590 A 5
2591 F 8
2600 A 8
2601 B 8
2602 C 9
2603 C 9
3501 E14
3510 B 6
3511 A 6
3512 B 7
3513 A 6
3514 B 6
3515 A 5
3516 A 3
3517 A 3
3518 B 7
3519 A 7
3520 A 7
3530 F15
3541 G14
3542 G13
3543 G 9
3550 D 3
3560 E 4
3561 E 7
3562 E 7
3563 E 8
3564 E 8
3565 E 9
3566 D 8
3567 E 4
3568 F 4
3570 G 3
3571 I 3
3572 H 4
3580 J 3
3581 J 3
3582 J 4
3583 J 5
3590 I12
3600 B14
3601 A14
3602 A 8
3603 B 8
3604 B 8
3605 B 9
3606 B 9
3607 B 9
3608 A 9
3609 A 9
6550 D 3
6551 C 3
6560 E 3
6561 D13
6570 H 3
6571 I 2
6580 J 2
6590 H 4
6591 E 5
6592 G 4
6593 F 6
6594 G 5
6595 G 5
7511 B 3
7512 B 7
7513 A 7
7540 G13
7561 E13
7562 E 8
7563 D 7
7580 J 4
7590 A 4
7590 D 5
7590 E11
7591 F 8
7591 F11
7591 H 8
7595 I12
7600 A10
MVIO1 A16
MVIO2 D16
MVIO3 H16
SC2 D 1

3-47

3-47

SCART2, IN/OUT, VPS, TXT BOARD MVIO-TXT-unit N3 N5

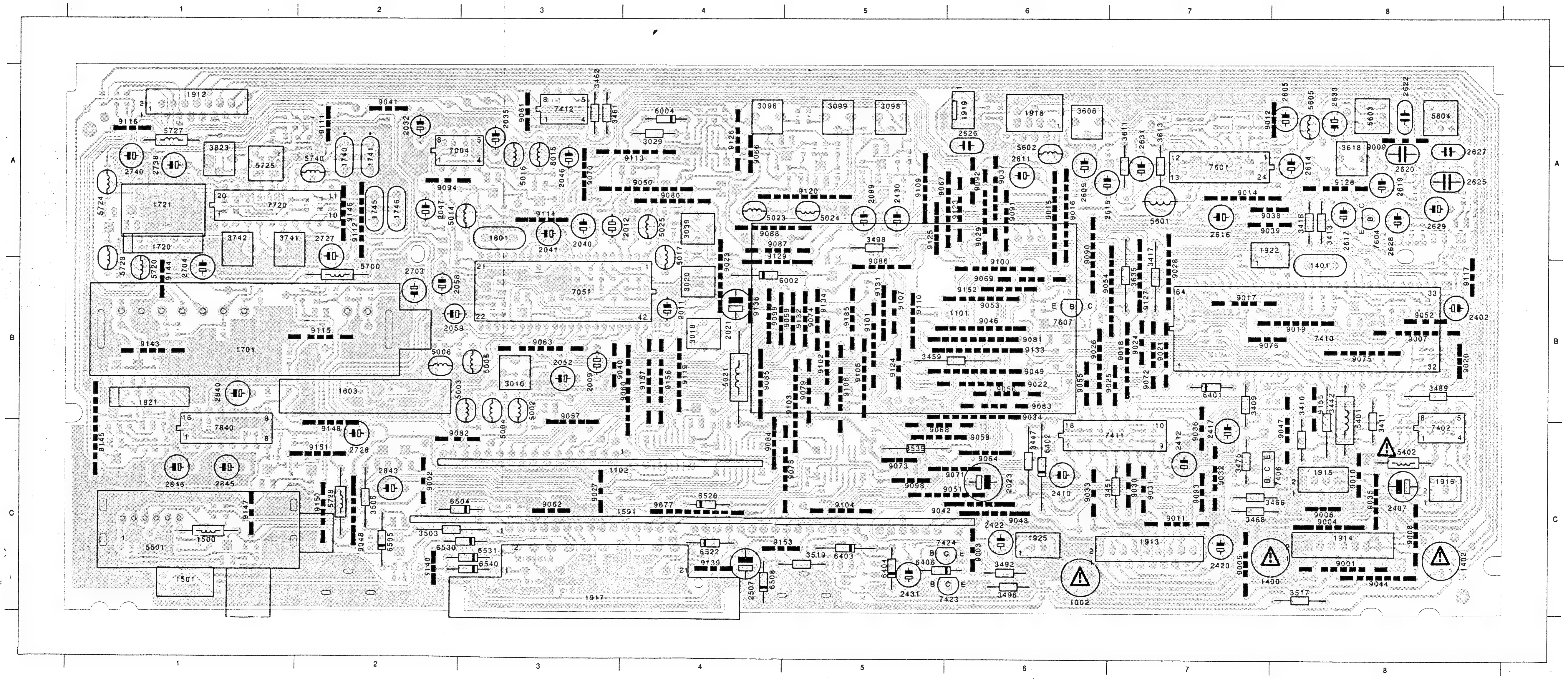




FAMILY BOARD N4

"INSERTED COMPONENTS ARE DEPENDENT ON THE SET TYPE"

1002 C 6	1720 A 1	1917 C 3	2040 A 3	2417 C 7	2617 A 8	2704 B 1	3029 A 4	3447 C 6	3503 C 2	3823 A 1	5024 A 5	5723 B 1	6406 C 5	7406 C 7	9002 C 2	9015 A 6	9027 C 3	9039 A 7	9052 B 8	9064 C 6	9077 C 4	9090 A 6	9105 B 5	9119 B 4	9134 B 5	9151 C 2
1101 B 6	1721 A 1	1918 A 6	2041 A 3	2420 C 7	2619 A 8	2727 A 2	3039 A 4	3451 C 7	3505 C 2	5002 B 3	5025 A 4	5724 A 1	6504 C 3	7410 B 8	9003 C 6	9016 A 6	9028 B 7	9040 B 3	9053 B 6	9066 A 4	9078 C 5	9091 A 6	9106 B 5	9120 A 5	9135 B 5	9152 B 6
1102 C 3	1740 A 2	1919 A 6	2046 A 3	2422 C 6	2620 A 8	2728 C 2	3096 A 4	3459 B 6	3517 C 8	5003 B 3	5401 B 8	5725 A 1	6505 C 2	7411 C 7	9004 C 8	9017 B 7	9029 A 6	9041 A 2	9054 B 7	9067 A 6	9079 B 5	9092 A 6	9107 B 5	9123 A 6	9136 B 4	9153 C 4
1400 C 8	1741 A 2	1922 B 7	2047 A 2	2430 A 5	2622 A 8	2738 A 1	3098 A 5	3461 A 3	3519 C 5	5004 B 3	5402 C 8	5727 A 1	6508 C 4	7412 A 3	9005 C 7	9018 B 7	9030 C 7	9042 C 6	9055 B 6	9068 C 5	9080 A 4	9093 C 7	9109 A 5	9124 B 5	9139 C 4	9155 B 8
1401 B 8	1745 A 2	1925 C 6	2052 B 3	2431 C 5	2625 A 8	2740 A 1	3099 A 5	3462 A 3	3539 C 5	5005 B 3	5501 C 1	5728 C 2	6520 C 4	7423 C 6	9006 C 8	9019 B 8	9031 C 7	9043 C 6	9056 B 6	9069 B 6	9081 B 6	9094 A 2	9110 B 5	9125 A 5	9140 C 2	9156 B 4
1402 C 8	1746 A 2	2009 B 3	2058 B 2	2507 C 4	2626 A 6	2840 B 1	3409 B 7	3466 C 7	3606 A 6	5006 B 2	5601 A 7	5740 A 2	6522 C 4	7424 C 6	9007 B 8	9020 B 8	9032 C 7	9044 C 8	9057 C 3	9070 A 3	9082 C 2	9098 C 5	9111 A 2	9126 A 4	9143 B 1	9157 B 4
1500 C 1	1821 B 1	2011 B 4	2059 B 2	2605 A 8	2627 A 8	2843 C 2	3410 C 8	3468 C 7	3611 A 7	5014 A 3	5602 A 6	6002 B 4	6530 C 3	7601 A 7	9008 C 8	9021 B 7	9033 C 6	9046 B 6	9058 C 5	9071 C 6	9083 B 6	9099 B 4	9112 A 2	9127 B 7	9144 B 1	
1501 C 1	1912 A 1	2012 A 3	2099 A 5	2609 A 6	2628 A 8	2845 C 1	3411 B 8	3475 C 7	3613 A 7	5015 A 3	5603 A 8	6004 A 4	6531 C 3	7604 A 8	9009 A 8	9022 B 6	9034 B 6	9047 C 8	9059 B 4	9072 B 7	9084 C 4	9100 B 6	9113 A 4	9128 A 8	9145 C 1	
1591 C 3	1913 C 7	2021 B 4	2402 B 8	2611 A 6	2629 A 8	2846 C 1	3413 A 8	3489 B 8	3618 A 8	5016 A 3	5604 A 8	6401 B 7	6540 C 3	7607 B 6	9010 C 8	9023 B 4	9035 C 8	9048 C 2	9060 B 4	9073 C 5	9085 B 4	9101 B 5	9114 A 3	9129 B 4	9146 A 2	
1601 A 3	1914 C 8	2023 C 6	2407 C 8	2614 A 8	2631 A 7	3010 B 3	3416 A 8	3492 C 6	3635 B 7	5017 A 4	5605 A 8	6402 C 6	7004 A 2	7720 A 1	9011 C 7	9024 B 7	9036 C 7	9049 B 6	9061 A 3	9074 B 5	9086 B 5	9102 B 5	9115 B 2	9131 B 5	9147 C 1	
1603 B 2	1915 C 8	2032 A 2	2410 C 6	2615 A 6	2633 A 8	3018 B 4	3417 B 7	3496 C 6	3741 A 1	5021 B 4	5700 B 2	6403 C 5	7051 B 3	7840 C 1	9012 A 8	9025 B 7	9037 A 6	9050 A 4	9062 C 3	9075 B 8	9087 A 4	9103 B 5	9116 A 1	9132 B 5	9148 C 2	
1701 B 1	1916 C 8	2035 A 3	2412 C 7	2616 A 7	2703 B 2	3020 B 4	3442 C 8	3498 A 5	3742 A 1	5023 A 4	5720 B 1	6404 C 5	7402 C 8	9001 C 8	9014 A 7	9026 B 6	9038 A 7	9051 C 6	9063 B 3	9076 B 7	9088 A 4	9104 C 5	9117 B 8	9133 B 6	9150 C 2	



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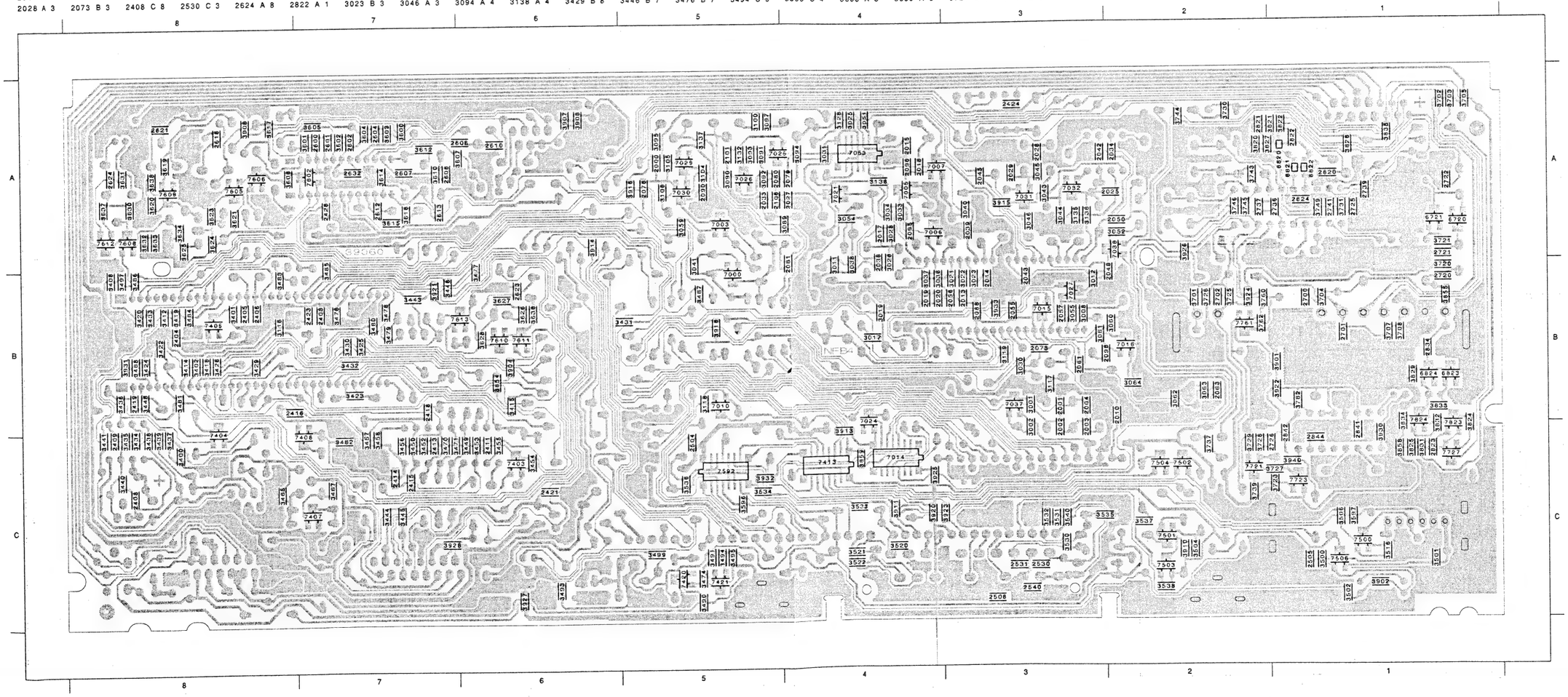
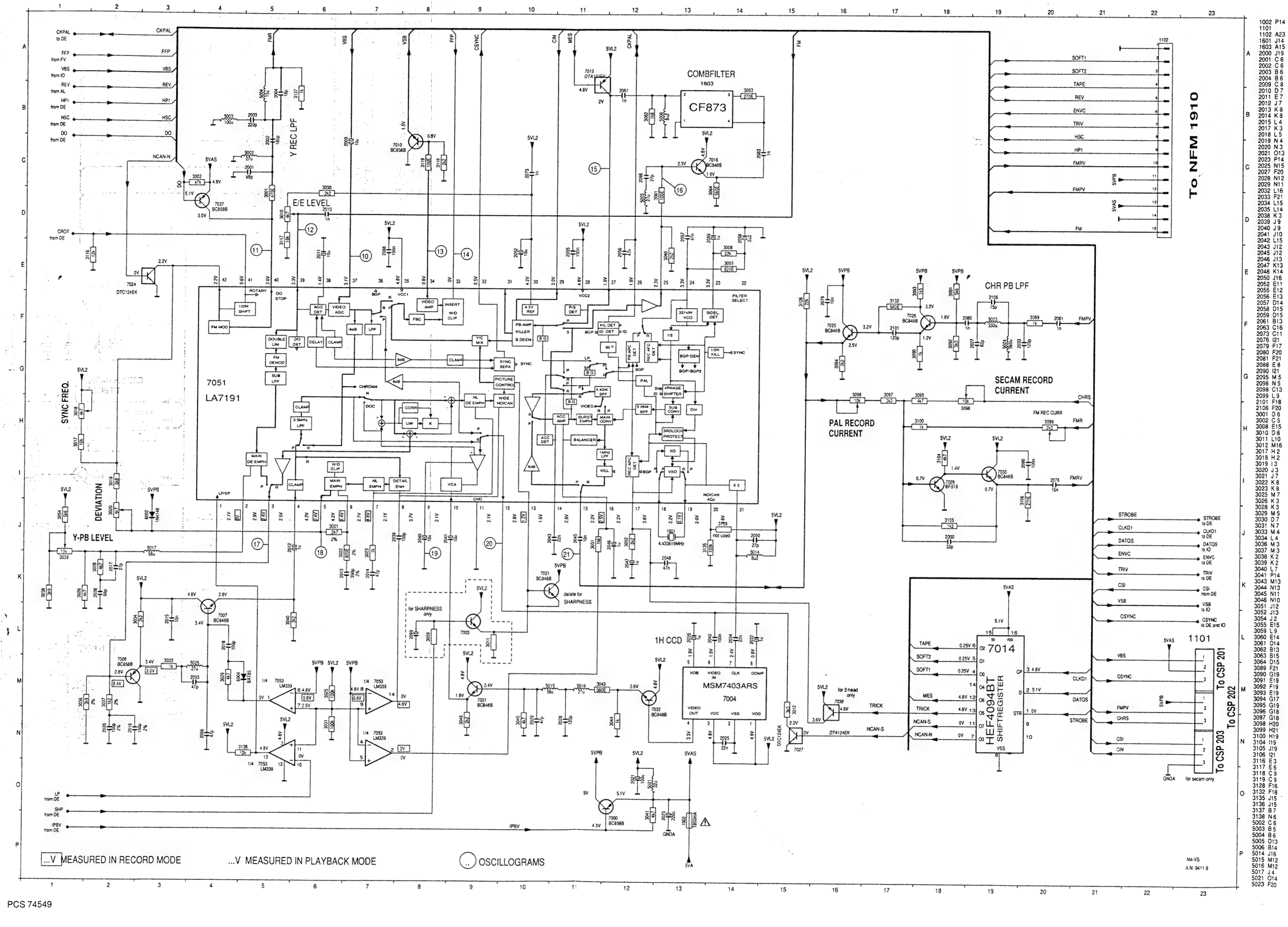
FAMILY BOARD N4

"INSERTED COMPONENTS ARE DEPENDENT ON THE SET TYPE"

2000 A 5 2001 B 3 2002 C 3 2003 C 3 2004 B 3 2010 B 2 2013 B 3 2014 B 3 2015 A 4 2017 A 4 2018 A 4 2019 B 4 2020 B 4 2025 A 2 2027 A 4 2028 A 3
2029 A 3 2033 A 5 2034 A 2 2038 A 4 2039 A 3 2042 A 3 2043 B 3 2045 A 3 2048 B 2 2050 A 2 2055 B 3 2056 B 3 2057 B 3 2061 B 3 2063 B 2 2073 B 3
2076 A 5 2079 A 4 2080 A 5 2081 A 4 2088 B 3 2090 A 5 2095 A 4 2096 A 4 2098 B 2 2101 A 5 2106 A 5 2403 B 7 2404 B 8 2405 B 8 2406 B 8 2408 C 8
2409 C 8 2411 C 6 2413 C 7 2414 C 7 2415 C 7 2416 B 8 2418 B 7 2419 B 8 2421 C 6 2423 B 7 2424 A 3 2428 A 7 2504 C 5 2505 C 1 2506 C 3 2530 C 3
2531 C 3 2540 C 3 2600 A 7 2601 A 7 2602 A 7 2604 A 7 2606 A 6 2607 A 7 2608 A 7 2610 A 6 2612 A 7 2613 A 7 2618 A 8 2621 A 8 2623 B 6 2624 A 8
2632 A 7 2700 B 1 2701 B 1 2702 B 2 2720 B 1 2721 A 1 2722 A 1 2725 A 1 2726 C 1 2736 A 1 2737 A 2 2739 A 1 2741 A 1 2820 A 1 2821 A 2 2822 A 1
2823 C 1 2824 A 1 2834 B 1 2841 C 1 2842 C 1 2844 C 1 3001 B 3 3002 C 3 3008 B 3 3011 B 4 3012 B 3 3017 B 4 3019 B 4 3021 B 3 3022 B 3 3023 B 3
3025 A 4 3026 A 4 3028 A 4 3030 B 3 3031 A 4 3033 A 4 3034 A 4 3036 B 4 3037 B 4 3038 B 4 3040 A 3 3041 B 5 3043 A 3 3044 A 3 3045 A 3 3046 A 3
3051 A 4 3052 A 2 3054 A 4 3055 B 3 3059 A 5 3060 B 2 3061 B 3 3062 B 2 3063 B 2 3064 B 2 3089 A 4 3090 A 5 3091 A 5 3092 A 5 3093 A 5 3094 A 4
3095 A 5 3097 A 5 3100 A 5 3104 A 5 3105 A 5 3106 A 5 3116 B 6 3117 B 3 3118 B 5 3119 B 3 3128 A 4 3132 A 5 3135 A 3 3136 A 3 3137 A 5 3138 A 4
3400 C 8 3401 B 8 3402 B 8 3408 B 8 3412 B 8 3414 B 8 3415 B 6 3418 B 8 3419 B 8 3420 B 8 3422 B 8 3423 B 7 3424 B 8 3425 B 7 3426 B 8 3429 B 8
3430 B 7 3431 B 5 3432 B 7 3433 B 8 3434 C 8 3435 C 8 3436 B 8 3437 C 8 3438 C 8 3439 C 8 3440 C 8 3441 C 8 3443 B 7 3444 C 7 3445 C 7 3446 B 7
3448 B 8 3449 C 6 3450 C 7 3452 C 7 3453 C 6 3454 C 6 3455 C 6 3456 C 7 3457 C 7 3458 C 7 3465 C 8 3467 C 7 3470 C 7 3471 C 7 3474 C 5 3476 B 7
3477 B 6 3478 B 7 3479 B 7 3480 B 7 3481 B 8 3482 C 7 3483 B 8 3484 B 8 3485 B 7 3486 B 8 3487 B 5 3488 B 8 3490 C 5 3491 C 5 3493 C 6 3494 C 5
3495 C 5 3497 B 8 3499 C 5 3500 C 1 3501 C 1 3502 C 1 3504 C 2 3506 C 1 3516 C 1 3520 C 4 3521 C 4 3522 C 4 3530 C 3 3531 C 3 3532 C 3 3533 C 4
3534 C 5 3535 C 3 3536 C 5 3537 C 2 3538 C 2 3540 C 3 3596 C 5 3597 C 1 3600 A 7 3601 A 7 3602 A 7 3603 A 7 3604 A 7 3605 A 7 3607 A 6 3608 A 8
3610 A 7 3612 A 7 3614 A 7 3615 A 7 3616 A 7 3617 A 8 3619 A 8 3620 A 8 3621 A 8 3623 A 8 3624 A 8 3625 A 8 3626 B 6 3627 B 6 3628 B 6 3630 A 8
3631 A 8 3632 A 8 3633 A 8 3634 A 8 3636 B 6 3637 A 8 3638 A 8 3701 B 2 3702 A 1 3703 A 1 3704 B 1 3705 A 1 3707 B 1 3708 B 1 3720 B 1 3721 A 1
3723 C 1 3725 B 2 3726 B 2 3727 C 1 3728 C 2 3729 C 2 3730 A 2 3731 A 1 3737 C 2 3739 C 2 3743 A 2 3744 A 2 3745 A 2 3746 A 2 3749 A 1 3760 B 2
3762 B 2 3782 B 1 3820 A 2 3821 A 1 3822 A 1 3824 C 1 3825 C 1 3826 A 1 3827 A 2 3829 B 1 3831 C 1 3832 C 1 3833 B 1 3834 C 1 3835 A 1 3854 B 6
3855 B 1 3858 C 1 3859 C 4 3901 B 1 3902 C 1 3903 A 8 3904 B 6 3906 A 8 3907 A 6 3908 A 6 3910 C 2 3911 C 4 3913 C 4 3914 A 6 3915 A 3 3916 A 5
3918 B 5 3920 C 4 3921 B 7 3922 B 1 3923 C 3 3924 B 2 3925 C 4 3926 A 2 3927 C 6 3928 C 7 3930 C 1 3931 B 8 3932 C 5 3933 B 3 3940 C 1 6720 A 1
6721 A 1 6820 A 1 6821 A 1 6822 A 1 6823 B 1 6824 B 1 7000 B 5 7003 A 5 7005 A 4 7006 A 4 7007 A 4 7010 B 5 7014 C 4 7015 B 3 7016 B 2 7021 A 4
7024 B 4 7025 A 5 7026 A 5 7027 B 3 7029 A 5 7030 A 5 7031 A 3 7032 A 3 7037 B 3 7038 A 2 7053 A 4 7403 C 6 7404 C 8 7405 B 8 7407 C 7 7408 C 7
7413 C 4 7420 C 5 7421 C 5 7500 C 1 7501 C 2 7502 C 2 7503 C 2 7504 C 2 7506 A 8 7592 C 5 7602 A 7 7605 A 8 7606 A 8 7608 A 8 7609 A 8 7610 B 6
7612 A 8 7613 B 6 7721 A 1 7723 A 1 7727 A 1 7761 B 2 7823 C 1 7824 B 1



FAMILY BOARD VIDEOSIGNALPROCESSING - VS



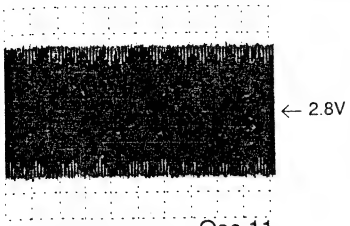
1002 P14
1101
1102 A23
1601 J14
1603 A15
2000 J19
2001 C6
2002 C6
2003 B6
2004 B6
2009 C8
2010 D7
2011 E7
2012 J7
2013 K8
2014 K8
2015 L4
2017 K3
2018 L5
2019 N4
2020 N3
2021 O13
2023 P14
2025 N15
2027 F20
2028 N12
2029 N11
2032 L16
2033 F21
2034 L15
2035 L14
2038 K3
2039 J9
2040 J9
2041 J10
2042 L15
2043 J12
2045 J12
2046 J13
2047 K13
2048 K14
2050 J16
2052 E11
2055 E12
2056 E13
2057 D14
2058 D15
2059 D15
2061 B13
2063 C16
2073 C11
2076 I21
2079 F17
2080 F20
2081 F21
2088 E8
2090 I21
2095 M5
2096 N5
2098 C13
2099 L9
2101 F18
2106 F20
3001 D6
3002 D5
3008 E15
3010 D6
3011 L10
3012 M16
3017 H2
3018 H2
3019 I3
3020 J3
3021 J7
3022 K8
3023 K8
3025 M7
3026 K3
3028 K3
3029 M5
3030 D7
3031 N7
3033 M4
3034 L4
3036 M3
3037 M3
3038 K2
3039 K2
3040 L7
3041 P14
3043 M13
3044 N13
3045 N11
3046 N10
3051 J12
3052 J13
3054 J2
3055 E15
3059 L9
3060 E14
3061 D14
3062 B13
3063 B15
3064 D15
3089 F21
3090 G19
3091 E19
3092 F19
3093 E19
3094 G17
3095 G19
3096 G18
3097 G18
3098 H20
3099 H21
3100 H19
3104 I19
3105 J19
3106 I21
3116 E3
3117 E6
3118 C9
3119 C9
3128 F16
3132 F18
3135 J15
3136 J15
3137 B7
3138 N6
5002 C6
5003 B5
5004 B6
5005 D13
5006 B14
5014 J16
5015 M12
5016 M12
5017 J4
5021 O14
5023 F20
5024 F20
5025 M5
6002 J4
6004 M6
7000 P13
7003 L10
7004 M15
7006 M3
7007 L5
7010 C9
7014 L20
7015 A12
7016 C15
7021 K12
7024 E3
7025 F17
7026 F19
7027 N17
7029 I19
7030 I20
7031 M10
7032 M14
7037 D5
7038 M17
7051 G5
7053 N8
7053 M7
7053 M8
7053 O6

PCS 74549

OSCILLOGRAMS
VIDEOSIGNALPROCESSING -VS

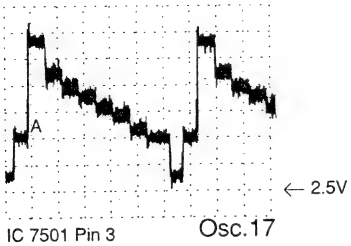
Unless otherwise indicated measured in position record.

A: AC, 0.2 V/Div , 2 us/Div



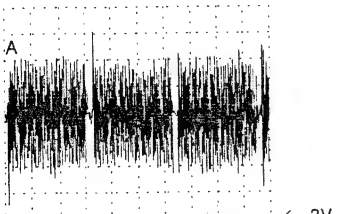
IC 7051 Pin 40 Osc.11

A: AC, 0.1 V/Div , 10 us/Div



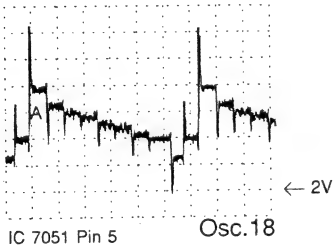
IC 7501 Pin 3 Osc.17

A: AC, 50 mV/Div , 20 us/Div



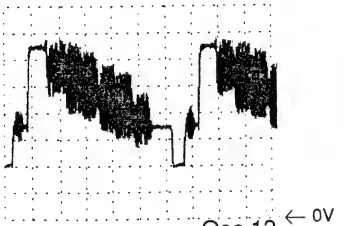
IC 7051 Pin 39 Osc.12
(measured in playback)

A: DC, 0.2 V/Div , 10 us/Div



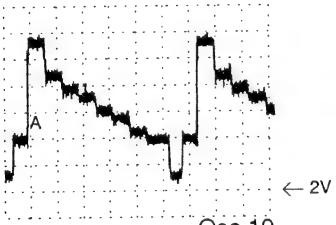
IC 7051 Pin 5 Osc.18

A: DC, 0.5 V/Div 10 us/Div



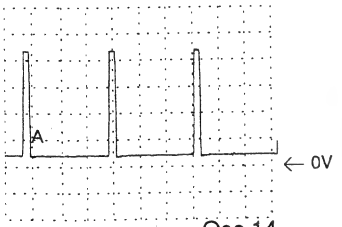
IC 7051 Pin 3 Osc.13
VSB(meas. in playback)

A: AC, 0.1 V/Div , 10 us/Div



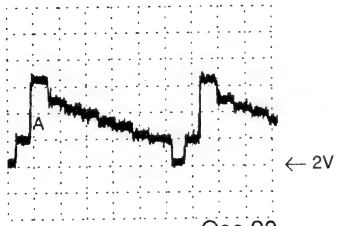
IC 7051 Pin 10 Osc.19
(measured in playback)

A: DC, 1.0 V/Div , 20 us/Div



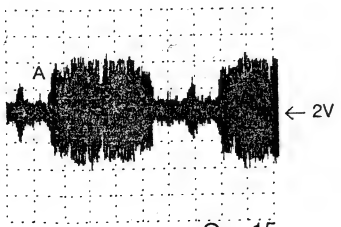
IC 7051 Pin 32 Osc.14

A: AC, 0.1 V/Div , 10 us/Div



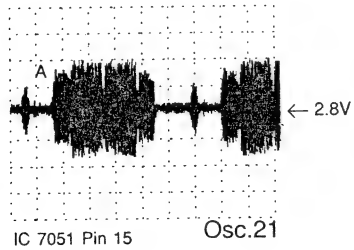
IC 7051 Pin 12 Osc.20
(measured in playback)

A: AC, 50 mV/Div , 5 ms/Div



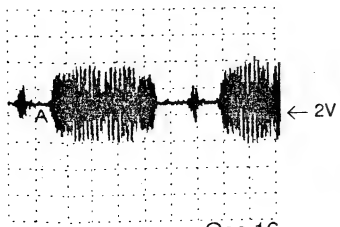
IC 7051 Pin 27 Osc.15
(measured in playback)

A: AC, 0.1 V/Div , 10 us/Div



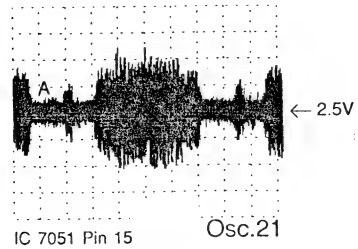
IC 7051 Pin 15 Osc.21

A: DC, 0.5 V/Div , 10 us/Div



IC 7051 Pin 25 Osc.16
(measured in playback)

A: AC, 0.2 V/Div , 10 us/Div

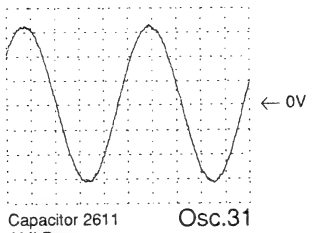


IC 7051 Pin 15 Osc.21
(measured in playback)

OSCILLOGRAMS
AUDIO LINEAR -AL

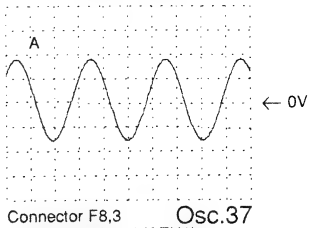
Unless otherwise indicated measured in position record.

A: DC, 0.2 V/Div, 0.2 ms/Div



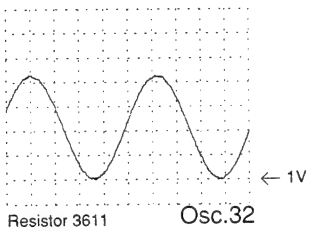
Capacitor 2611 Osc.31
AMLP

A: DC, 20 V/Div, 5 us/Div



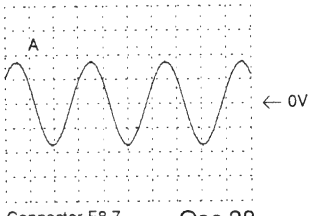
Connector F8,3 Osc.37
Audio erase head (AEH1)

A: DC, 0.2 V/Div, 0.2 ms/Div



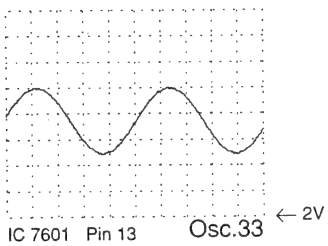
Resistor 3611 Osc.32
AMLR

A: DC, 10 V/Div, 5 us/Div



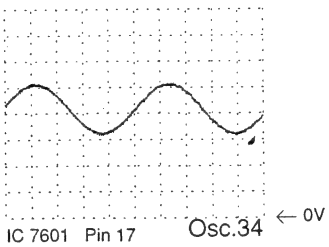
Connector F8,7 Osc.38
Audio R/P Head (ARH)

A: DC, 0.5 V/Div, 0.2 ms/Div



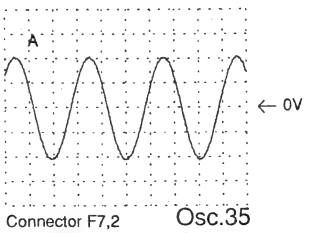
IC 7601 Pin 13 Osc.33

A: DC, 1 V/Div, 0.2 ms/Div



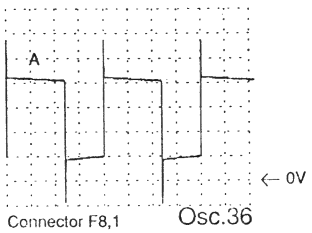
IC 7601 Pin 17 Osc.34

A: DC, 0.1 V/Div, 5 us/Div



Connector F7,2 Osc.35
Main erase head (MEH1)

A: DC, 1 V/Div, 10 ms/Div



Connector F8,1 Osc.36
CTL1

ed in position record.

DC, 20 V/Div, 5 us/Div

A

← 0V

nnector F8,3 Osc.37
dio erase head (AEH1)

DC, 10 V/Div, 5 us/Div

A

← 0V

nnector F8,7 Osc.38
dio R/P Head (ARH)

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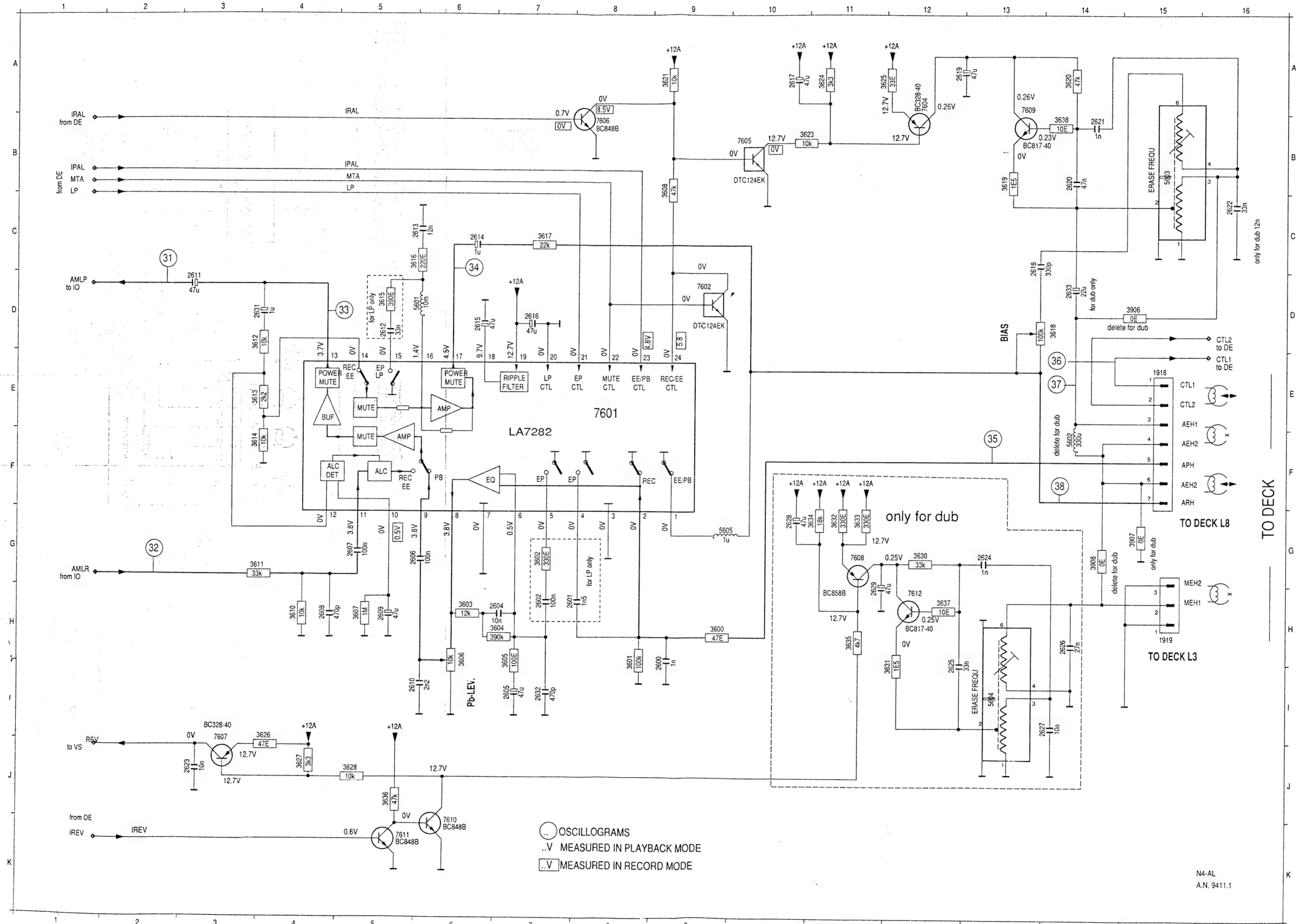
FAMILY BOARD AUDIO LINEAR - AL

3-51



1918 E15
1919 H15
2600 H 9
2601 H 7
2602 H 7
2604 H 7
2605 I 7
2606 G 5
2607 G 5
2608 H 4
2609 H 5
2610 I 5
2611 D 3
2612 D 5
2613 C 5
2614 C 6
2615 D 6
2616 D 7
2617 A10
2618 C13
2619 A12
2620 B14
2621 B14
2622 C16
2623 J 3
2624 G13
2625 I12
2626 H14
2627 I14
2628 G10
2629 H11
2631 D 3
2632 I 7
2633 D14
3600 H 9
3601 H 8
3602 G 7
3603 H 6
3604 H 7
3605 H 7
3606 H 6
3607 H 5
3608 B 9
3610 H 4
3611 G 3
3612 D 3
3613 E 3
3614 F 3
3615 D 5
3616 C 5
3617 C 7
3618 D14
3619 B13
3620 A14
3621 A 9
3623 B10
3624 A11
3625 A11
3626 I 4
3627 J 4
3628 J 5
3630 G12
3631 I12
3632 G11
3633 G11
3634 G11
3635 H11
3636 J 5
3637 H12
3638 B14
3906 D15
3907 G15
3908 G14
5601 D 6
5602 F14
5603 B15
5604 I13
5605 G 9
7601 E 8
7602 D 9
7604 A12
7605 B10
7606 B 8
7607 I 3
7608 G11
7609 A13
7610 K 6
7611 K 5
7612 H12

3-52 3-52

FAMILY BOARD FRONT END - FV N4

* VERSION						
Pos.	/01	/19	/39	/05	/59	/07
1701	UV916E	UV916E	UV916E	U944C	UV916E	UV916E
1720	G1966M	K3953M	———	J1952M	K2950M	J1952M
1740	TRAP 5,5MHz	TRAP 6,5MHz	TRAP 5,5MHz	TRAP 6,0MHz	TRAP 5,5MHz	TRAP 6MHz
1741	———	———	TRAP 6,0MHz	———	TRAP 6.5MHz	———
1745	BP 5,5MHz	———	BP 5,5MHz	BP 6,0MHz	BP 5,5MHz	BP 6MHz
1746	———	———	BP 6,0MHz	———	BP 6,5MHz	———
2842	———	———	220n	———	———	———
3707	———	10k	10k	10k	———	———
3708	10k	———	———	10k	10k	10k
3743	270E	270E	220E	270E	270E	270E
3745	560E	———	560E	560E	560E	560E
3782	2k7	———	2k7	2k7	2k7	2k7
3901	———	0E	———	———	———	———
3940	0E	———	———	0E	0E	0E
7720	TDA9800	TDA9803	TDA9802	TDA9800	TDA9800	TDA9800
	PAL-BG	SEC-L	PAL-BG & SEC-L	PAL-I	PS-DK	PAL-I-IR

for SEC-L and MULTISTANDARD only

UV916E 1701 *

TDA9830/V1 7840

7720 *

1021 L9453M

1720 * K6256K 1721

1740 * 1741 1745 * 1746

delete for MULTISTANDARD

for MULTISTANDARD only

delete for SEC-L

delete for PAL

delete for /01, /07, /59

L = SECAM

H = PAL

TO RF-MODULATOR

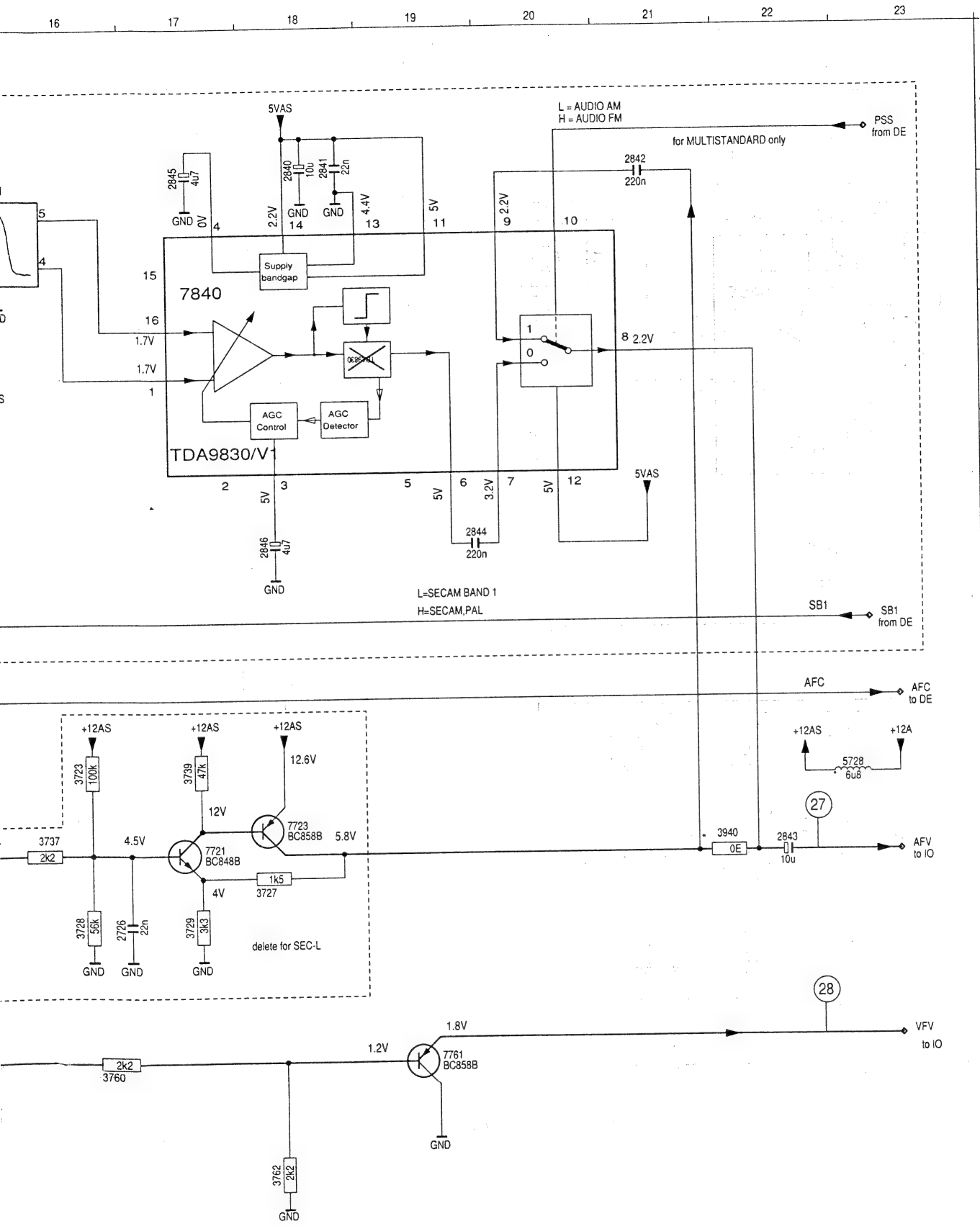
SCL from DE

SDA from DE

AGC to DE

PSS from DE

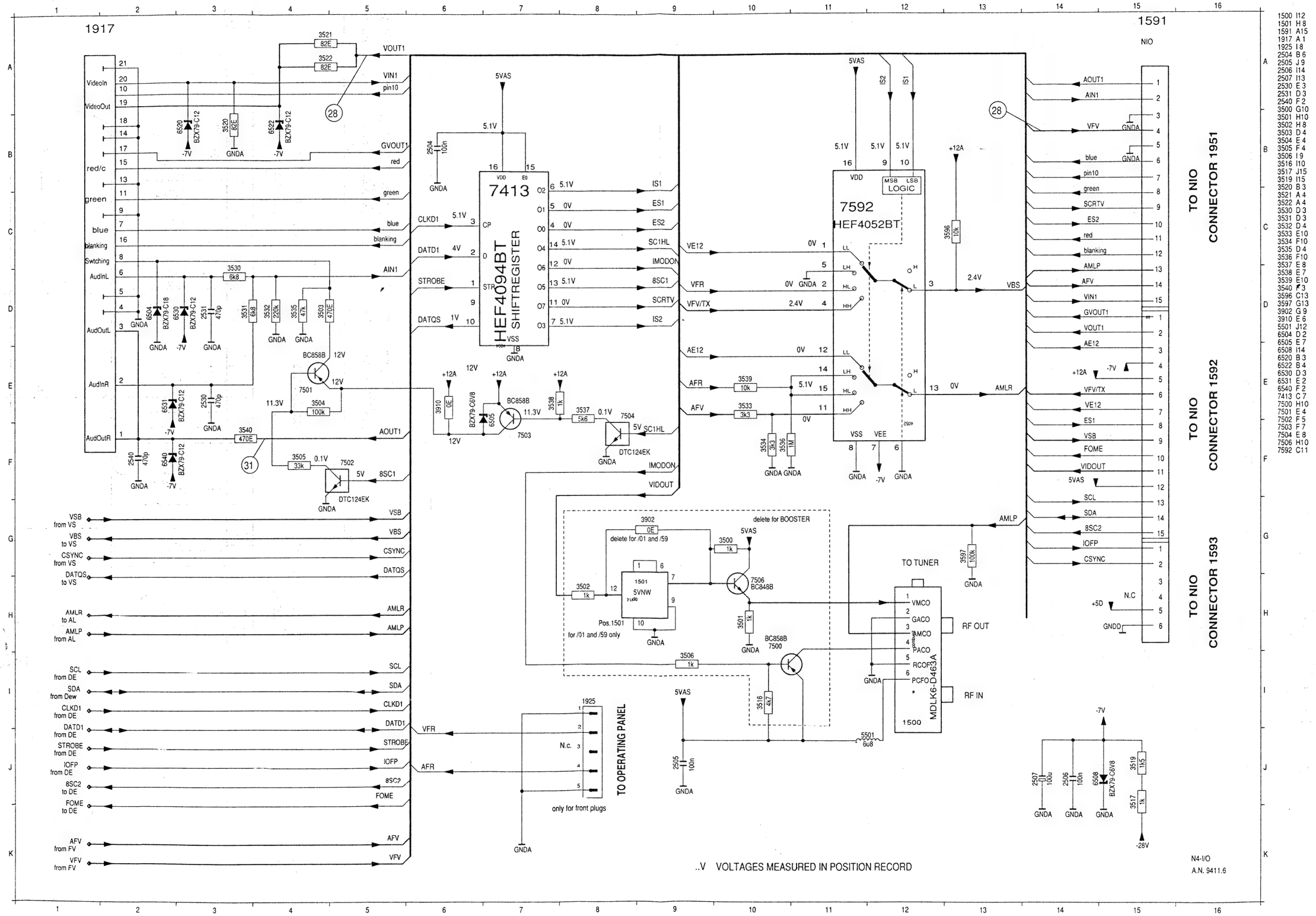
3-52



1720 G 8
1721 H 8
1740 J13
1741 K13
1745 J15
1746 K15
1821 B15
2700 K 3
2701 K 2
2702 F 2
2703 F 4
2704 K 4
2720 H 6
2721 I 6
2722 I 7
2725 F14
2726 H16
2727 H15
2728 G15
2736 F11
2737 G11
2738 F10
2739 F10
2740 J11
2741 J12
2820 E13
2821 E14
2822 E12
2823 D14
2824 F12
2834 B13
2840 A18
2841 A18
2842 A21
2843 G22
2844 E19
2845 A17
2846 E18
3701 F 5
3702 J 2
3703 J 2
3704 J 3
3705 K 3
3707 K 4
3708 K 4
3720 H 7
3721 I 7
3723 F16
3725 E 5
3726 F 5
3727 H18
3728 H16
3729 H17
3730 F15
3731 F15
3737 G16
3739 F17
3741 J 9
3742 J10
3743 J14
3744 J12
3745 J14
3746 K14
3749 F11
3760 I16
3762 J18
3782 J11
3820 D13
3821 D12
3822 E13
3823 E14
3824 C13
3825 D15
3826 C12
3827 D13
3829 C13
3831 D15
3832 C14
3833 A14
3834 A15
3835 D15
3901 K11
3940 G22
5700 K 3
5720 I 6
5723 H 7
5724 I 7
5725 F13
5727 F10
5728 F23
5740 K13
6720 I 7
6721 H 7
6820 D13
6821 E13
6822 E12
6823 B14
6824 B14
7720 H13
7721 G17
7723 G18
7727 C12
7761 I19
7823 C14
7824 C15
7840 C17

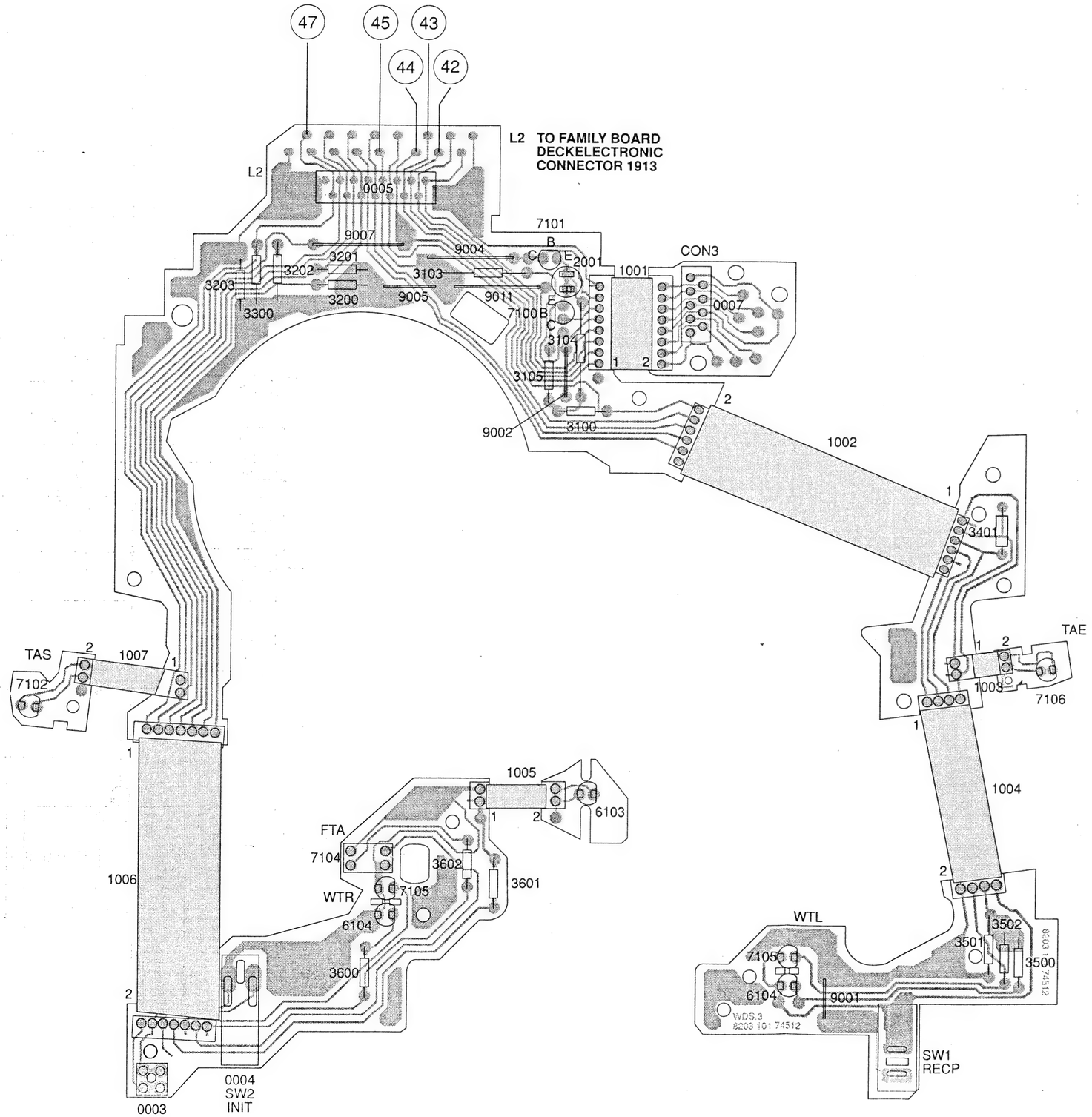
3-53

FAMILY BOARD IN/OUT - I/O N4



3-54 3-54

TAPE DECK SENSOR BOARD



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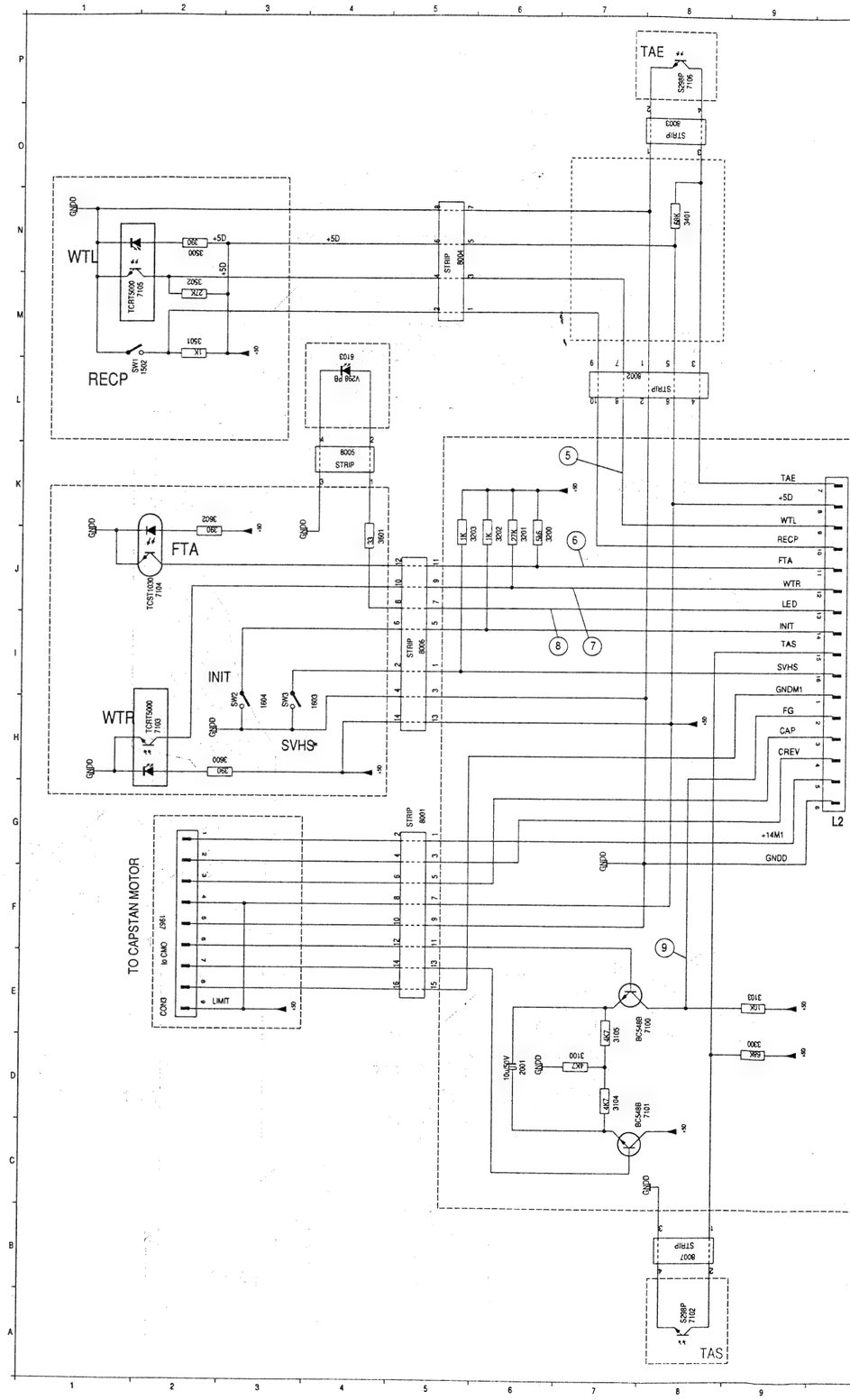
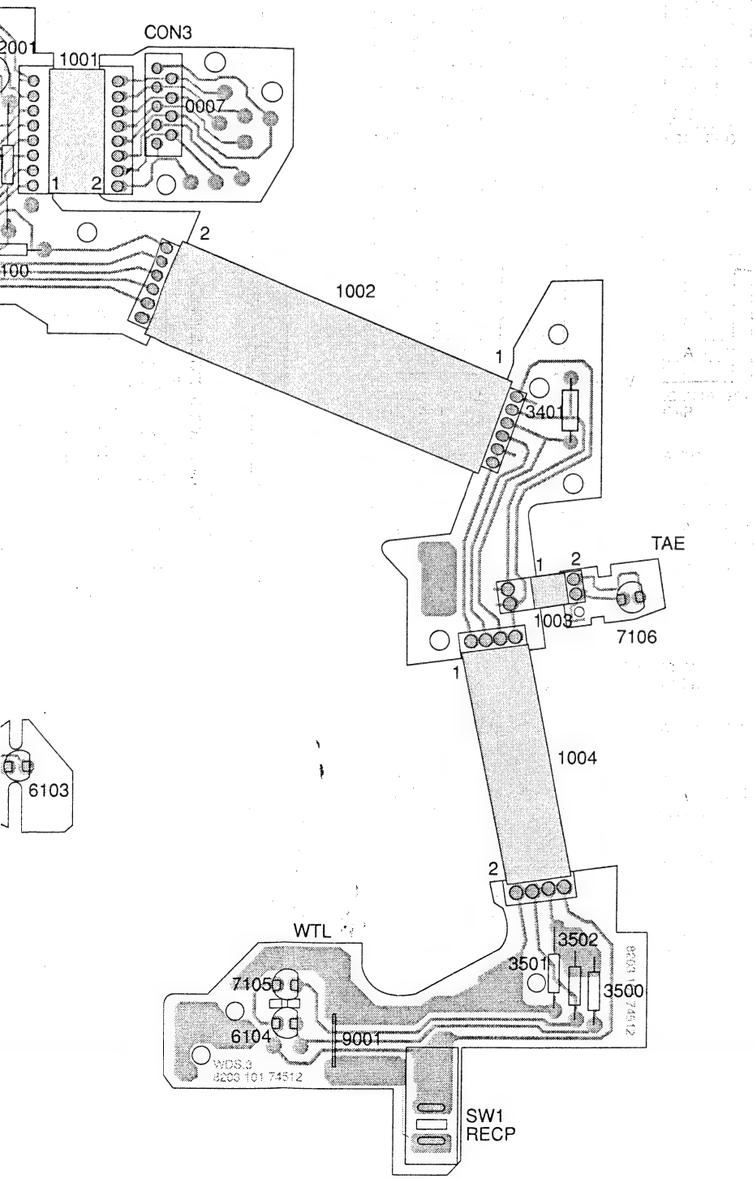
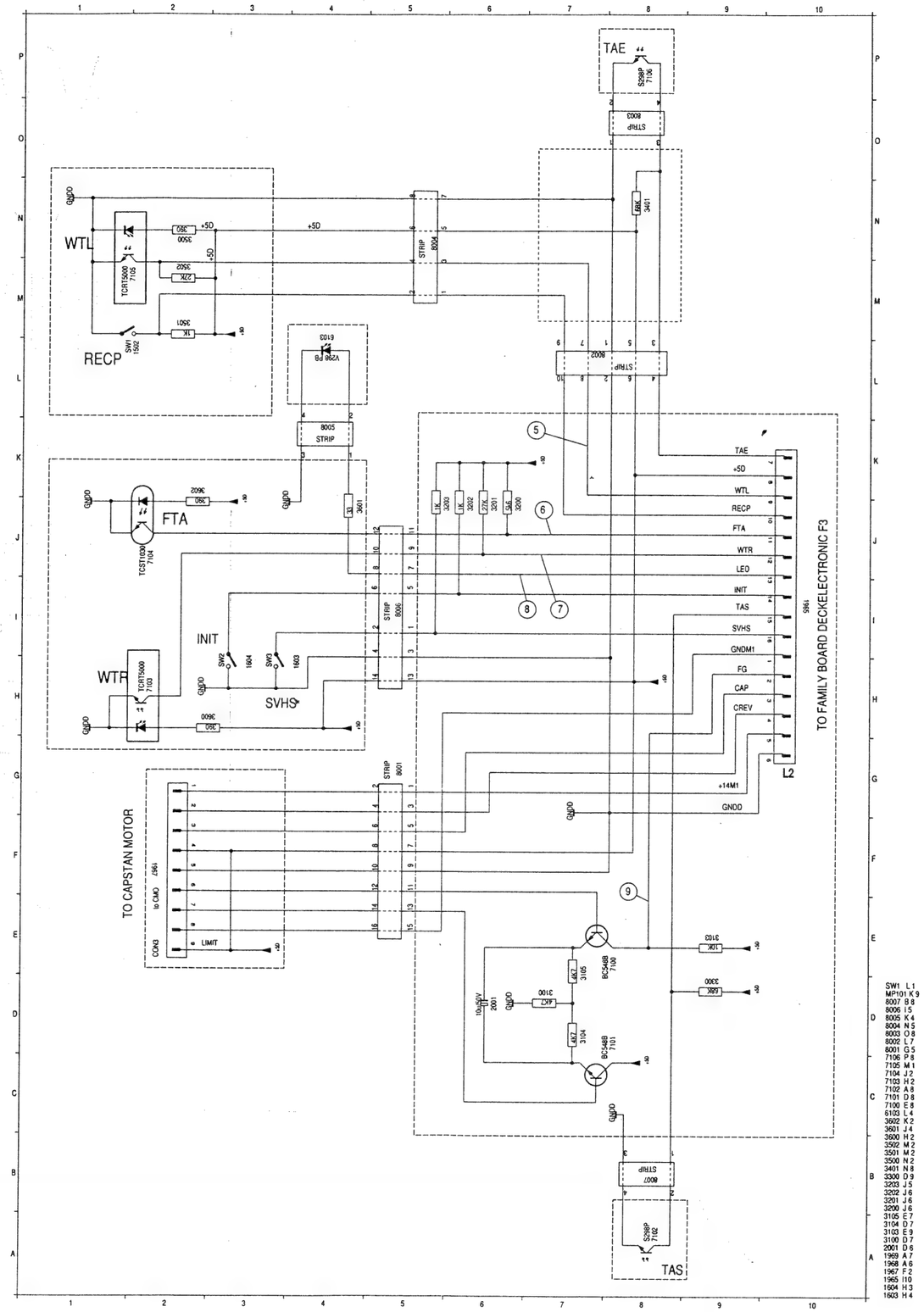


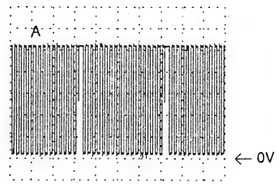
3-54

MILY BOARD
ELECTRONIC
ECTOR 1913



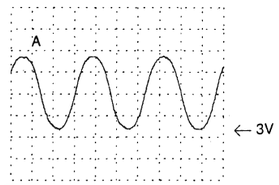


A: DC, 1 V/Div, 10 ms/Div



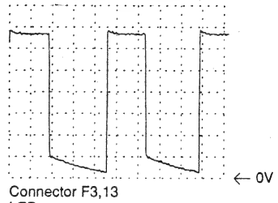
Connector F4,1
PG/FG

A: AC, 0.5 V/Div, 0.2 ms/Div



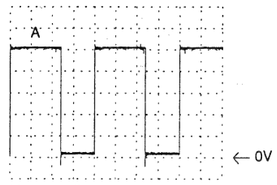
Connector F3,2
FG

A: DC, 0.5 V/Div, 0.5 ms/Div



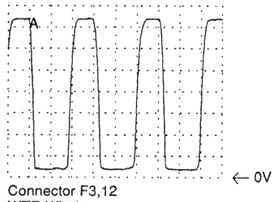
Connector F3,13
LED

A: DC, 1 V/Div, 10 ms/Div



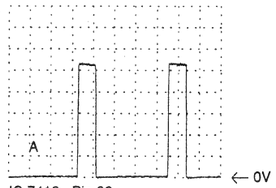
IC 7411 Pin 2
CTL1 REC

A: DC, 0.5 V/Div, 2 ms/Div



Connector F3,12
WTR Wind

A: DC, 1 V/Div, 10 us/Div

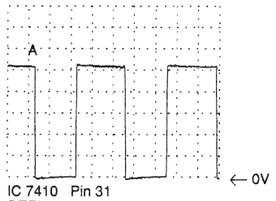


IC 7410 Pin 30
CAP

A: DC, 1 V/Div, 2 ms/Div

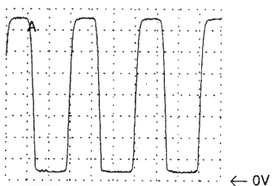
Connector F3,11
FTA Threading

A: DC, 1 V/Div, 10 us/Div



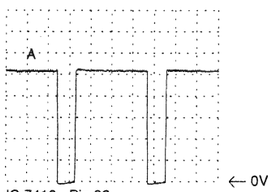
IC 7410 Pin 31
REEL

A: DC, 0.5 V/Div, 2 ms/Div



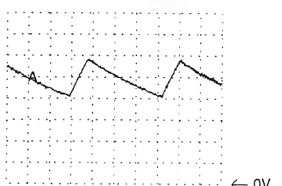
Connector F3,9
WTL Wind

A: DC, 1 V/Div, 10 us/Div



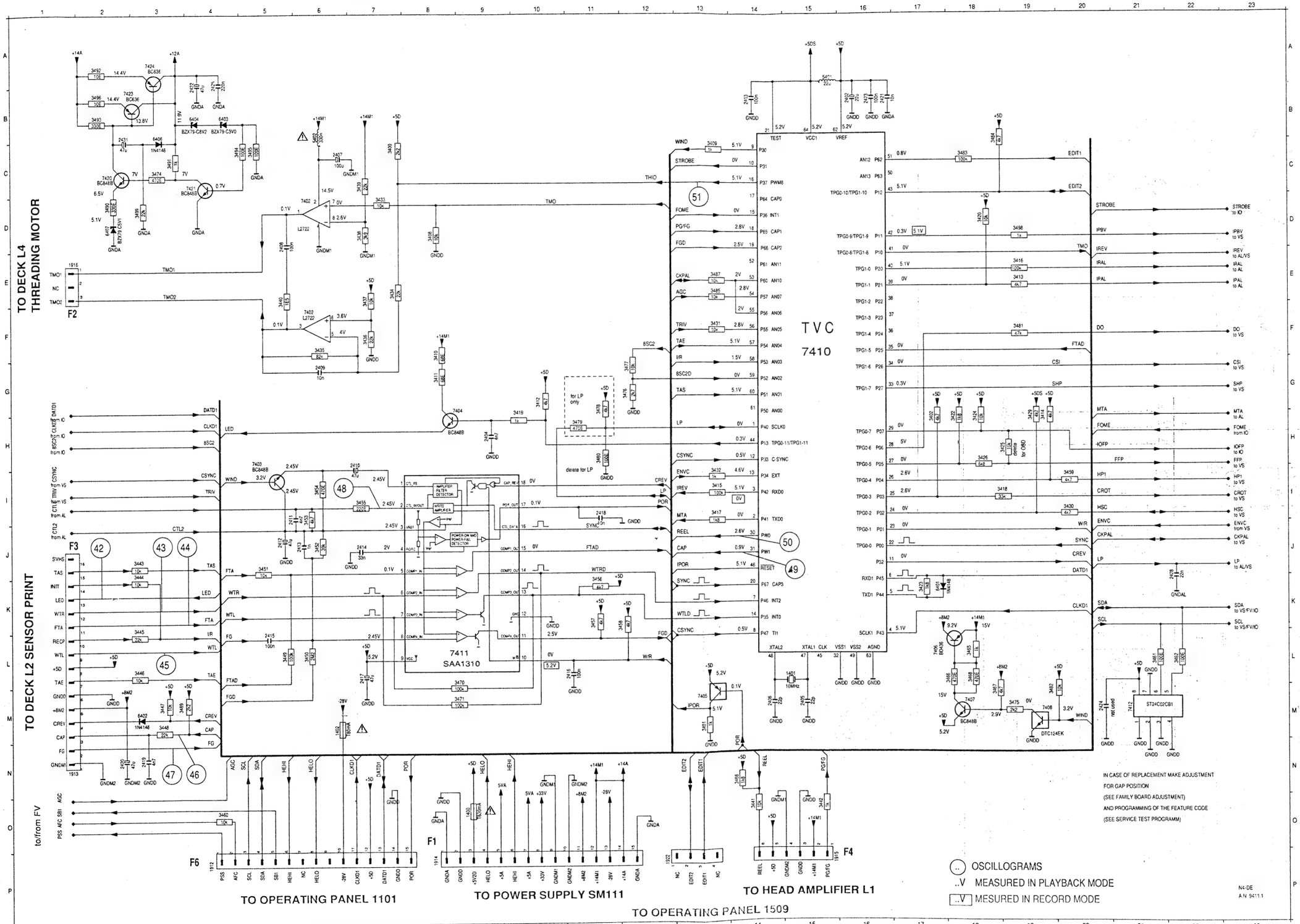
IC 7410 Pin 32
THIO

A: DC, 0.2 V/Div, 10 us/Div



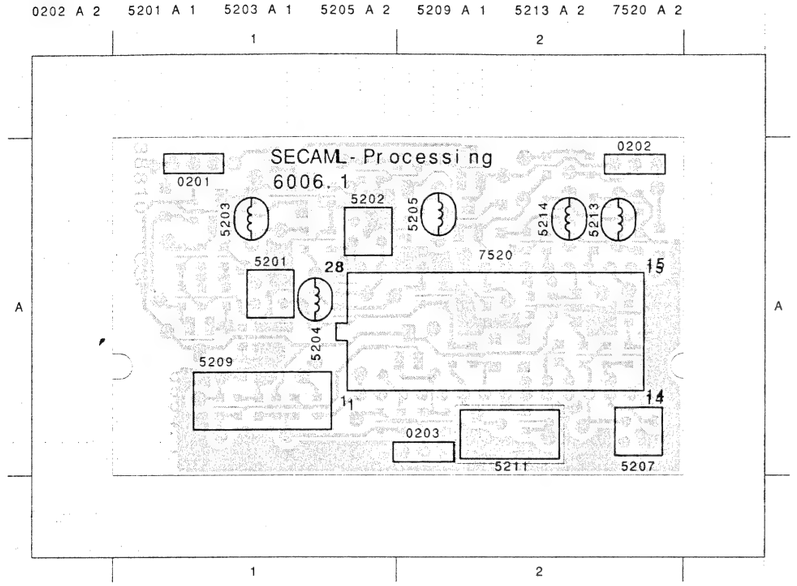
Connector F3,3
CAP

FAMILY BOARD DECKELECTRONIC - DE N4

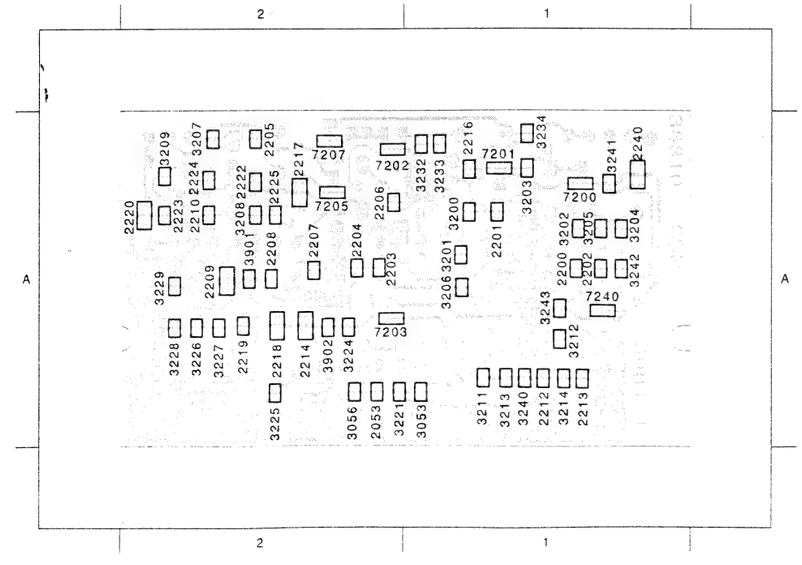


CHROMA SIGNAL SECAM PROCESSING BOARD CSP N4

0201 A 1 0203 A 2 5202 A 1 5204 A 1 5207 A 2 5211 A 2 5214 A 2
0202 A 2 5201 A 1 5203 A 1 5205 A 2 5209 A 1 5213 A 2 7520 A 2



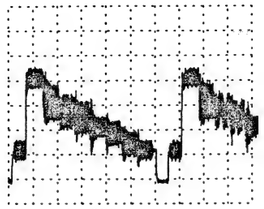
2053 A 2 2209 A 2 2222 A 2 3203 A 1 3214 A 1 3234 A 1 7203 A 2
2200 A 1 2210 A 2 2223 A 2 3204 A 1 3221 A 2 3240 A 1 7205 A 2
2201 A 1 2212 A 1 2224 A 2 3205 A 1 3224 A 2 3241 A 1 7207 A 2
2202 A 1 2213 A 1 2225 A 2 3206 A 1 3225 A 2 3242 A 1 7240 A 1
2203 A 2 2214 A 2 2240 A 1 3207 A 2 3226 A 2 3243 A 1
2204 A 2 2216 A 1 3053 A 1 3208 A 2 3227 A 2 3901 A 2
2205 A 2 2217 A 2 3056 A 2 3209 A 2 3228 A 2 3902 A 2
2206 A 2 2218 A 2 3200 A 1 3211 A 1 3229 A 2 7200 A 1
2207 A 2 2219 A 2 3201 A 1 3212 A 1 3232 A 1 7201 A 1
2208 A 2 2220 A 2 3202 A 1 3213 A 1 3233 A 1 7202 A 2



PCS 74556

OSCILLOGRAMS CHROMA SECAM PRINT CSP

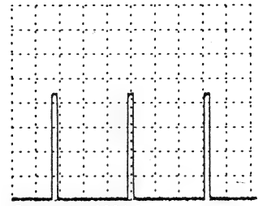
A: DC, 200mV/Div, 10us/Div



← 2V

Connector 0201,1 VBS — Osc. 60

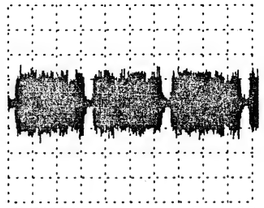
A: DC, 1 V/Div, 20us/Div



← 0V

Connector 0201,3 CSYNC — Osc. 61

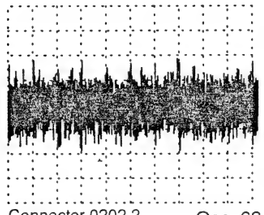
A: AC, 50mV/Div, 20us/Div



← 2.6V

IC 7520,25 — Osc. 62

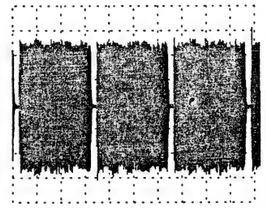
A: AC, 100mV/Div, 20ms/Div



← 2.8V

Connector 0202,2 FMPV — Osc. 63

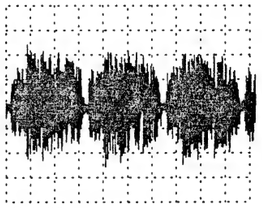
A: AC, 100mV/Div, 20us/Div



← 1.3V

IC 7520,16 — Osc. 64

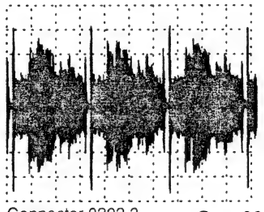
A: AC, 200mV/Div, 20us/Div



← 1.8V

IC 7520,1 — Osc. 65

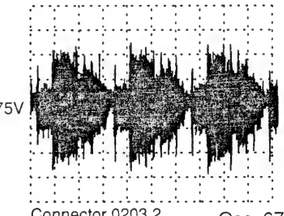
A: AC, 100mV/Div, 20us/Div



← 0.75V

Connector 0202,3 CHRS — Osc. 66

A: AC, 50mV/Div, 20us/Div



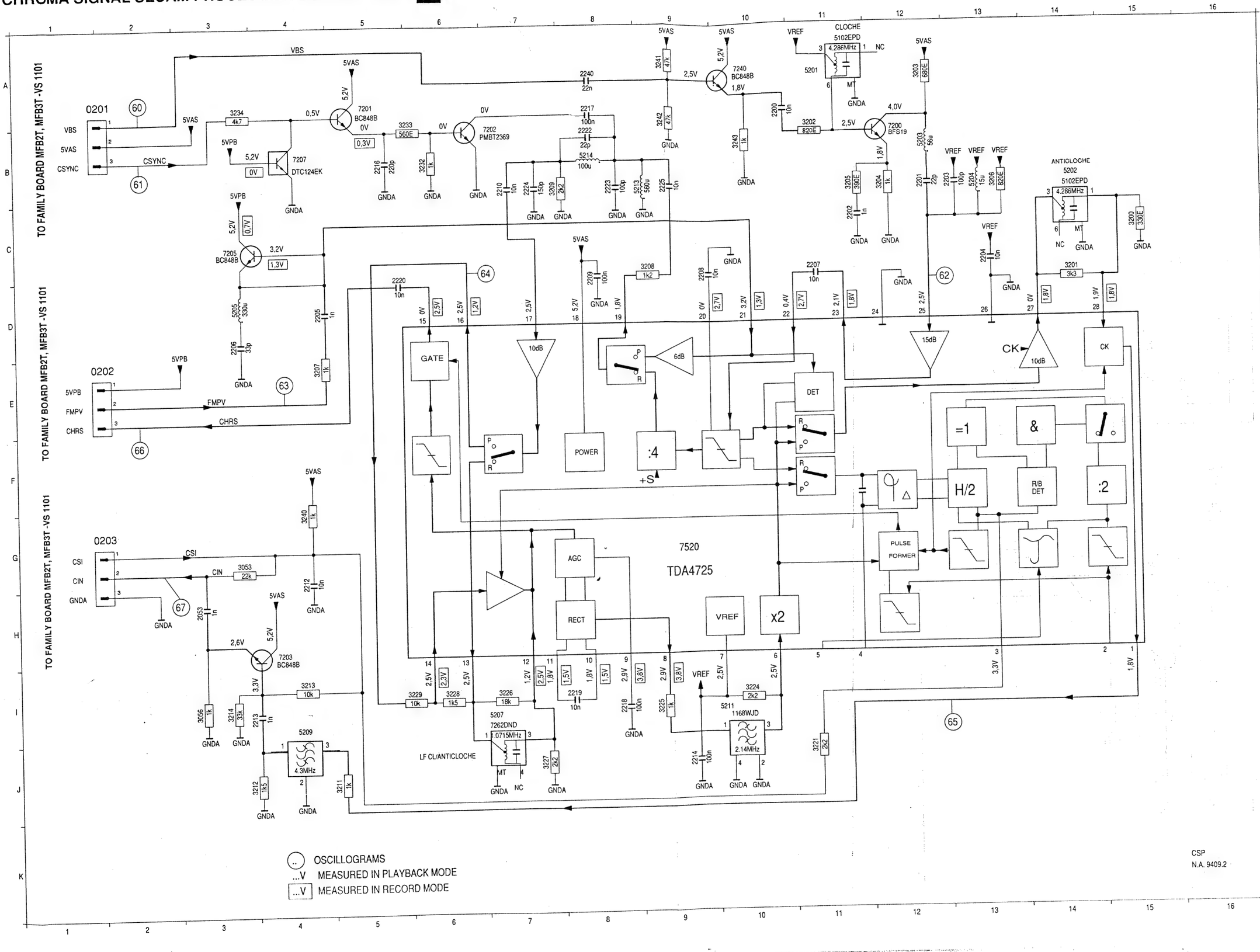
← 2.7V

Connector 0203,2 CIN — Osc. 67

REMARKS :

3-57

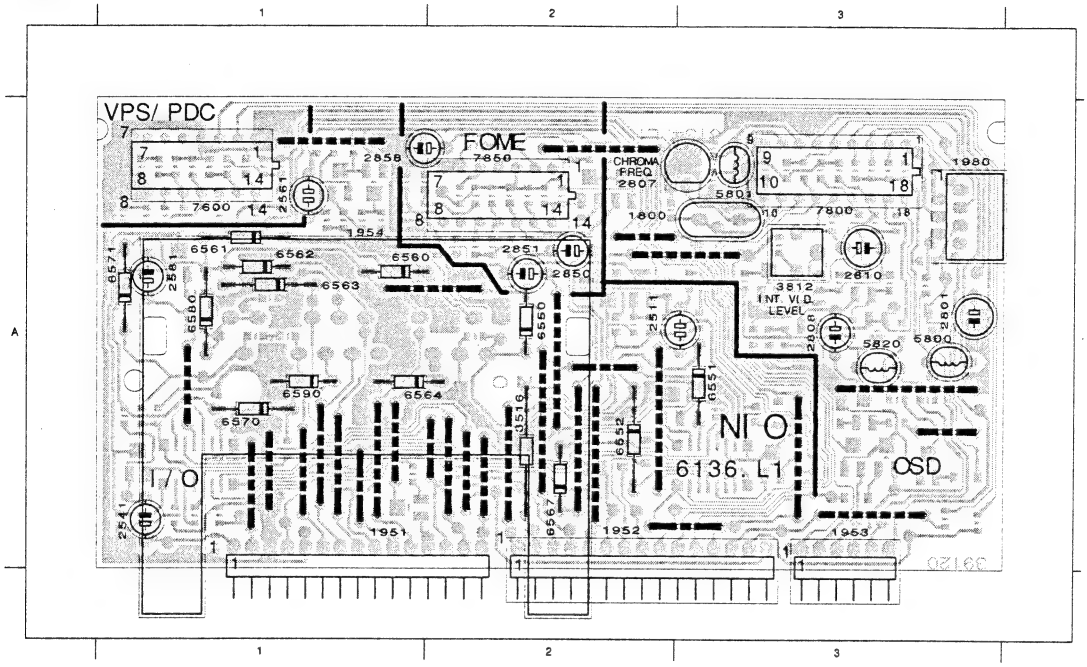
CHROMA SIGNAL SECAM PROCESSING BOARD CSP N4



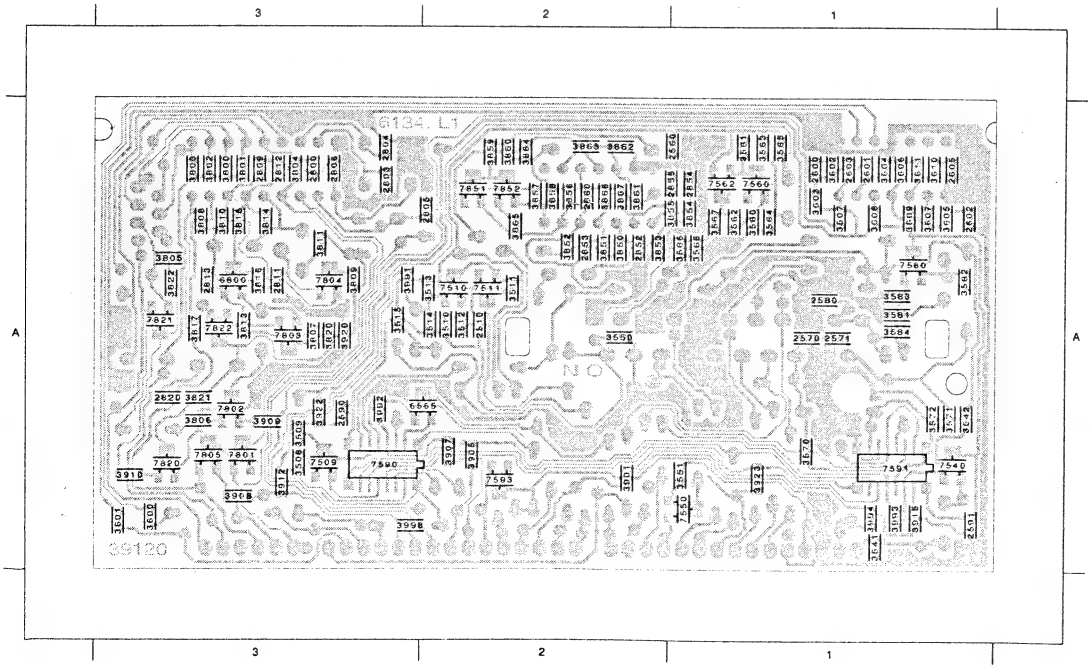
0201 A 2
0202 E 2
0203 G 2
2053 H 3
2200 A10
2201 B12
2202 C11
2203 B13
2204 C13
2205 D 4
2206 D 3
2207 C11
2208 D 9
2209 D 6
2210 B 7
2212 G 4
2213 I 3
2214 J 9
2216 B 6
2217 A 8
2218 I 8
2219 I 8
2220 D 5
2222 B 8
2223 B 8
2224 B 7
2225 B 9
2240 A 8
3053 G 3
3056 I 3
3200 C15
3201 D14
3202 B11
3203 A12
3204 B12
3205 B11
3206 B13
3207 E 4
3208 C 9
3209 B 7
3211 J 5
3212 I 3
3213 I 4
3214 I 3
3221 J11
3224 I10
3225 I 9
3226 I 7
3227 J 7
3228 I 6
3229 I 6
3232 B 6
3233 B 6
3234 A 3
3240 G 4
3241 A 9
3242 A 9
3243 B10
5201 A11
5202 B14
5203 B12
5204 B13
5205 D 3
5207 I 7
5209 I 4
5211 I10
5213 B 9
5214 B 8
7200 B12
7201 A 5
7202 B 7
7203 H 4
7205 C 3
7207 B 4
7240 A10
7520 G 9

NIO BOARD N4

1800 A 3	2511 A 3	2808 A 3	3812 A 3	6552 A 2	6567 A 2	7800 A 3	9004 A 3	9010 A 1	9016 A 2	9023 A 1	9030 A 3
1951 A 1	2541 A 1	2810 A 3	5800 A 3	6560 A 1	6570 A 1	7850 A 2	9005 A 2	9011 A 2	9017 A 2	9024 A 2	9031 A 3
1952 A 2	2561 A 1	2850 A 2	5801 A 3	6561 A 1	6571 A 1	9000 A 3	9006 A 2	9012 A 2	9018 A 2	9025 A 1	
1953 A 3	2581 A 1	2851 A 2	5820 A 3	6562 A 1	6580 A 1	9001 A 3	9007 A 2	9013 A 2	9020 A 1	9027 A 2	
1954 A 1	2801 A 3	2858 A 1	6550 A 2	6563 A 1	6590 A 1	9002 A 2	9008 A 1	9014 A 1	9021 A 1	9028 A 2	
1980 A 3	2807 A 3	3516 A 2	6551 A 3	6564 A 1	7600 A 1	9003 A 2	9009 A 1	9015 A 1	9022 A 1	9029 A 3	



2510 A 2	2803 A 3	2860 A 2	3551 A 1	3581 A 1	3609 A 1	3810 A 3	3853 A 2	3866 A 2	3991 A 3	7562 A 1	7851 A 2
2560 A 1	2804 A 3	3507 A 1	3560 A 1	3582 A 1	3610 A 1	3811 A 3	3854 A 1	3867 A 2	3992 A 3	7580 A 1	7852 A 2
2570 A 1	2805 A 2	3508 A 3	3561 A 1	3583 A 1	3611 A 1	3813 A 3	3855 A 1	3901 A 2	3993 A 1	7590 A 3	
2571 A 1	2806 A 3	3509 A 3	3562 A 1	3584 A 1	3800 A 3	3814 A 3	3856 A 2	3905 A 2	3994 A 1	7591 A 1	
2580 A 1	2809 A 3	3510 A 2	3563 A 1	3600 A 3	3801 A 3	3815 A 3	3857 A 2	3907 A 2	3998 A 3	7593 A 2	
2590 A 3	2811 A 3	3511 A 2	3564 A 1	3601 A 3	3802 A 3	3816 A 3	3858 A 2	3908 A 3	6565 A 2	7801 A 3	
2591 A 1	2812 A 3	3512 A 2	3565 A 1	3602 A 1	3803 A 3	3817 A 3	3859 A 2	3909 A 3	6800 A 3	7802 A 3	
2600 A 1	2813 A 3	3513 A 2	3566 A 1	3603 A 1	3804 A 3	3820 A 3	3860 A 2	3910 A 3	7509 A 3	7803 A 3	
2601 A 1	2820 A 3	3514 A 2	3567 A 1	3604 A 1	3805 A 3	3821 A 3	3861 A 2	3912 A 3	7510 A 2	7804 A 3	
2602 A 1	2852 A 2	3515 A 3	3568 A 1	3605 A 1	3806 A 3	3822 A 3	3862 A 2	3915 A 1	7511 A 2	7805 A 3	
2603 A 1	2853 A 2	3541 A 1	3570 A 1	3606 A 1	3807 A 3	3850 A 2	3863 A 2	3920 A 3	7540 A 1	7820 A 3	
2605 A 1	2854 A 1	3542 A 1	3571 A 1	3607 A 1	3808 A 3	3851 A 2	3864 A 2	3922 A 3	7550 A 1	7821 A 3	
2800 A 3	2855 A 1	3550 A 2	3572 A 1	3608 A 1	3809 A 3	3852 A 2	3865 A 2	3923 A 1	7560 A 1	7822 A 3	



NIO-OSD/FOME-Part N4

FOLLOW-ME - OPTION

SECAM - OPTION

TO OPERATING PANEL

..V VOLTAGES MEASURED IN POSITION RECORD

OSD-FOME
A.N. 9411.6

NIO - IN/OUT-Part N4

—— to/from OSD/FOME ——

CSYNC IOFP VIDOUT VSB CHECK VFV VIN1 FOME

pin10 red green blue BSC2

VPS/PDC - Option

Pos 7600: SDA5642 for VPS only

7600 SDA5648

VCS PD1 INUL VCO IREF FBAS UDD

DATA-SYNC-SLICER CLOCK-PLL

DATA-AQUISITION

I2C-BUS INTERFACE

TIMING

CSO SDA SCL USS

Pos 2601: 220n for PDC only

Pos 2602: 33n for PDC only

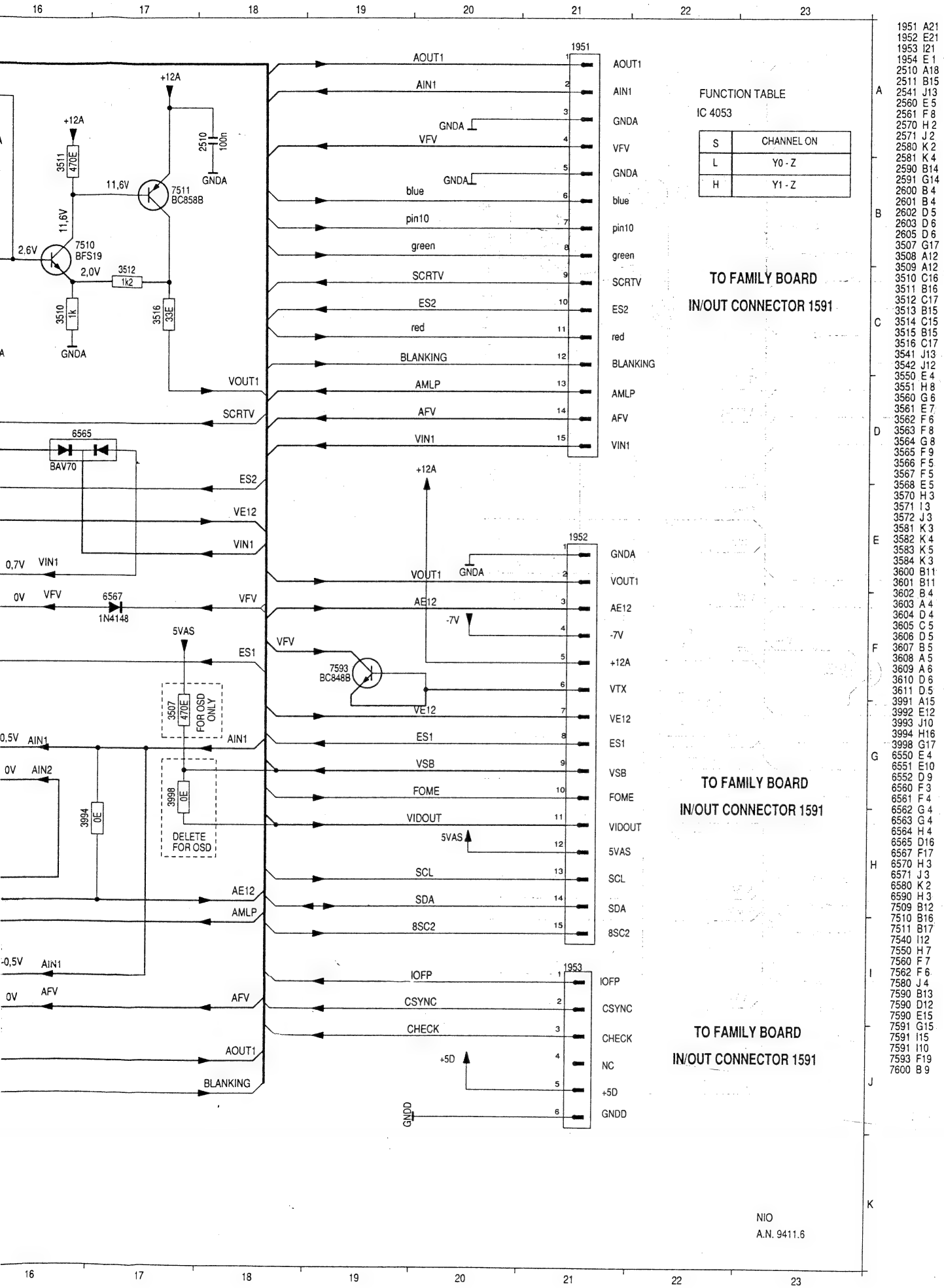
Pos 3605: 6k8 for PDC only

PDC-Option

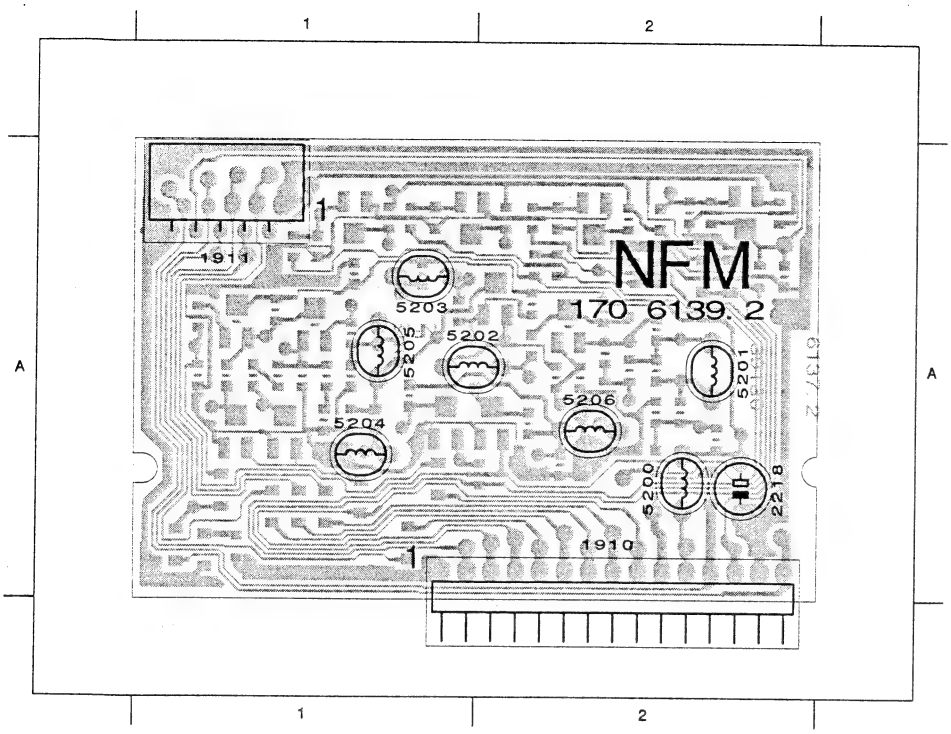
SCART 2 SCRAMBLE 1954

VideoIn VideoOut red/c green blue Switching AudInL AudInR AudOutL AudOutR

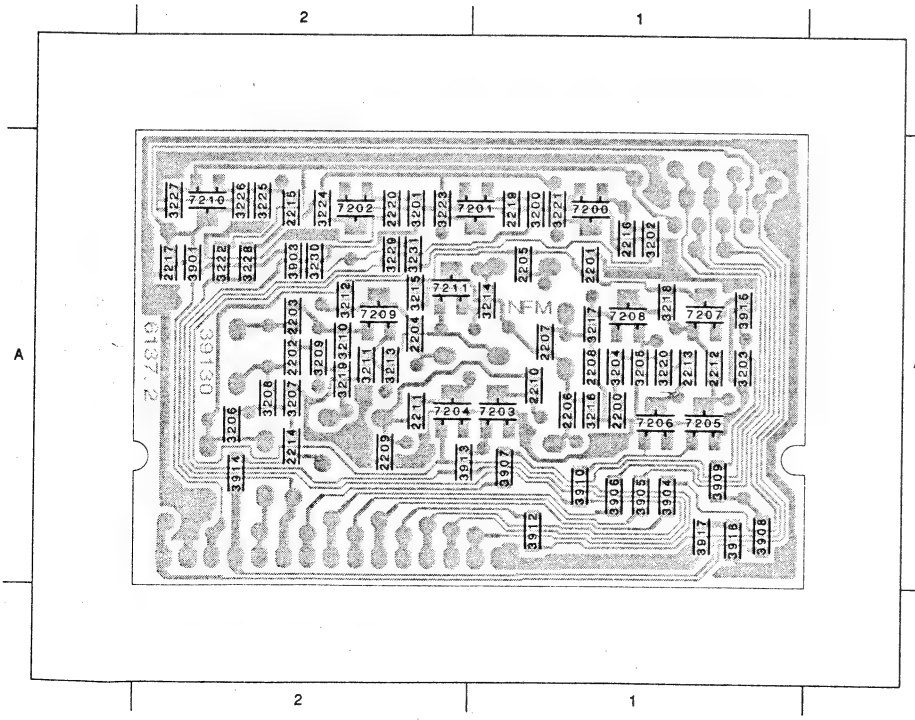
...V MEASURED IN PLAYBACK MODE


16 17 18 19 20 21 22 23
+12A
3511 470E
11,6V
7511 BC858B
2510 100n
GNDA
11,6V
2,6V
7510 BFS19
2,0V
3512 1k2
3510 1k
3516 33E
GNDA
VOUT1
SCRTV
6565
BAV70
ES2
VE12
VIN1
0,7V VIN1
0V VFV
6567 1N4148
VFV
5VAS
ES1
3507 470E FOR OSD ONLY
0,5V AIN1
AIN1
0V AIN2
3994 0E
3998 0E
DELETE FOR OSD
AE12
AMLP
-0,5V AIN1
0V AFV
AFV
AOUT1
BLANKING
1951
AOUT1
AIN1
GNDA
VFV
GNDA
blue
pin10
green
SCRTV
ES2
red
BLANKING
AMLP
AFV
VIN1
1 AOUT1
2 AIN1
3 GNDA
4 VFV
5 GNDA
6 blue
7 pin10
8 green
9 SCRTV
10 ES2
11 red
12 BLANKING
13 AMLP
14 AFV
15 VIN1
FUNCTION TABLE
IC 4053
S | CHANNEL ON
L | Y0 - Z
H | Y1 - Z
TO FAMILY BOARD
IN/OUT CONNECTOR 1591
+12A
1952
VOUT1
GNDA
AE12
-7V
7593 BC848B
VTX
VE12
ES1
VSB
FOME
VIDOUT
5VAS
SCL
SDA
8SC2
1 GNDA
2 VOUT1
3 AE12
4 -7V
5 +12A
6 VTX
7 VE12
8 ES1
9 VSB
10 FOME
11 VIDOUT
12 5VAS
13 SCL
14 SDA
15 8SC2
TO FAMILY BOARD
IN/OUT CONNECTOR 1591
1953
IOFP
CSYNC
CHECK
+5D
GNDD
1 IOFP
2 CSYNC
3 CHECK
4 NC
5 +5D
6 GNDD
TO FAMILY BOARD
IN/OUT CONNECTOR 1591
NIO
A.N. 9411.6
A B C D E F G H I J K
1951 A21
1952 E21
1953 I21
1954 E 1
2510 A18
2511 B15
2541 J13
2560 E 5
2561 F 8
2570 H 2
2571 J 2
2580 K 2
2581 K 4
2590 B14
2591 G14
2600 B 4
2601 B 4
2602 D 5
2603 D 6
2605 D 6
3507 G17
3508 A12
3509 A12
3510 C16
3511 B16
3512 C17
3513 B15
3514 C15
3515 B15
3516 C17
3541 J13
3542 J12
3550 E 4
3551 H 8
3560 G 6
3561 E 7
3562 F 6
3563 F 8
3564 G 8
3565 F 9
3566 F 5
3567 F 5
3568 E 5
3570 H 3
3571 I 3
3572 J 3
3581 K 3
3582 K 4
3583 K 5
3584 K 3
3600 B11
3601 B11
3602 B 4
3603 A 4
3604 D 4
3605 C 5
3606 D 5
3607 B 5
3608 A 5
3609 A 6
3610 D 6
3611 D 5
3991 A15
3992 E12
3993 J10
3994 H16
3998 G17
6550 E 4
6551 E10
6552 D 9
6560 F 3
6561 F 4
6562 G 4
6563 G 4
6564 H 4
6565 D16
6567 F17
6570 H 3
6571 J 3
6580 K 2
6590 H 3
7509 B12
7510 B16
7511 B17
7540 I12
7550 H 7
7560 F 7
7562 F 6
7580 J 4
7590 B13
7590 D12
7590 E15
7591 G15
7591 I15
7591 I10
7593 F19
7600 B 9

NFM BOARD N4



1910 A 2
1911 A 1
2218 A 2
5200 A 2
5201 A 2
5202 A 1
5203 A 1
5204 A 1
5205 A 1
5206 A 2



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2201 A 1	3208 A 2	3905 A 1
2202 A 2	3209 A 2	3906 A 1
2203 A 2	3210 A 2	3907 A 1
2204 A 2	3211 A 2	3908 A 1
2205 A 1	3212 A 2	3909 A 1
2206 A 1	3213 A 2	3910 A 1
2207 A 1	3214 A 1	3912 A 1
2208 A 1	3215 A 2	3913 A 2
2209 A 2	3216 A 1	3914 A 2
2210 A 1	3217 A 1	3915 A 1
2211 A 2	3218 A 1	3916 A 1
2212 A 1	3219 A 2	3917 A 1
2213 A 1	3220 A 1	7200 A 1
2214 A 2	3221 A 1	7201 A 1
2215 A 2	3222 A 2	7202 A 2
2216 A 1	3223 A 2	7203 A 1
2217 A 2	3224 A 2	7204 A 2
2219 A 1	3225 A 2	7205 A 1
2220 A 2	3226 A 2	7206 A 1
3200 A 1	3227 A 2	7207 A 1
3201 A 2	3228 A 2	7208 A 1
3202 A 1	3229 A 2	7209 A 2
3203 A 1	3230 A 2	7210 A 2
3204 A 1	3231 A 2	7211 A 2
3205 A 1	3901 A 2	
3206 A 2	3903 A 2	

NFM - FM PROCESSING N4

FM PROCESSING

5VPB

7207 BC848B
7208 BFS19
7211 BF824
7209 BFS19
7203 DTC124EK
7204 DTC124EK
7205 DTC124EK
7206 DTC124EK
7200 BFS19
7201 BFS19
7202 BFS19
7210 BC848B

3218 1k
2201 100n
3215 1k2
2205 68p
5203 15u
3214 390E
3212 680E
2204 68p
5202 270
3213 390E
3211 560E
5201 8u2
2203 27p
2202 47p
3208 330E
3206 18k
2214 1n
3210 270E
3209 1k
3207 18k
3219 470E
5206 15u
3217 1k
2207 27p
5205 15u
3205 470E
3204 680E
3220 470E
2208 33p
3216 560E
2206 330p
5204 100u
2212 47p
2200 100p
2213 10n
2210 47p
2209 56p
2211 47p
3229 4k7
3231 4k7
3203 2k2
3230 4k7
only for NFM
3222 0E
RECORD ATTENUATOR
only for NFMY
3226 22k
2217 22n
3228 330E
2215 10n
3221 3k3
3223 1k8
3224 820E
3202 10k
3200 10k
3201 10k
2216 22n
2219 22n
2220 22n
3225 10k
3227 470E
5200 27u
2218 47u

5VAS

1911 TO HEAD AMPLIFIER L6
1 GNDA
2 FMRV
3 HP1
4 HSC
5 TRIV
6 ENVC
7 REV
8 +5A
9 FMPV
10 GNDA

1910
15 FM
14 GNDA
13 +5VAS
12 FMPV
11 5VPB
10 FMRV
9 HP1
8 HSC
7 TRIV
6 ENVC
5 REV
4 TAPE
3 SOFT2
2 SOFT1
1 GNDA

TO FAMILY BOARD VIDEOSIGNALPROCESSING 1102

NFM
A.N. 9411.1

1910 J 8
1911 B15
2200 D 4
2201 B 4
2202 B 9
2203 B 8
2204 B 7
2205 A 5
2206 D 5
2207 C 5
2208 D 4
2209 D 8
2210 D 7
2211 D 8
2212 D 3
2213 D 4
2214 B10
2215 F11
2216 G 9
2217 E13
2218 H 3
2219 G10
2220 G10
3200 G 8
3201 G 8
3202 F 8
3203 E 3
3204 D 4
3205 D 4
3206 B10
3207 C10
3208 B10
3209 C 9
3210 C 8
3211 C 7
3212 B 7
3213 C 7
3214 B 5
3215 B 5
3216 D 5
3217 C 4
3218 B 3
3219 C 8
3220 D 4
3221 F 9
3222 D10
3223 F10
3224 F11
3225 F12
3226 E12
3227 F12
3228 F 9
3229 E 6
3230 F 4
3231 E 7
5200 H 4
5201 B 9
5202 C 6
5203 B 6
5204 D 6
5205 C 5
5206 D 8
7200 F 9
7201 F10
7202 F11
7203 E 7
7204 E 8
7205 E 4
7206 E 5
7207 B 3
7208 C 4
7209 B 7
7210 E12
7211 C 5

7207 A 2
7208 A 2
7209 A 2
7210 A 2
7211 A 2
7212 A 2
7213 A 2
7214 A 1
7215 A 2
7216 A 1
7217 A 1
7218 A 1
7219 A 2
7220 A 1
7221 A 1
7222 A 2
7223 A 2
7224 A 2
7225 A 2
7226 A 2
7227 A 2
7228 A 2
7229 A 2
7230 A 2
7231 A 2
7901 A 2
7903 A 2

3904 A 1
3905 A 1
3906 A 1
3907 A 1
3908 A 1
3909 A 1
3910 A 1
3912 A 1
3913 A 2
3914 A 2
3915 A 1
3916 A 1
3917 A 1
7200 A 1
7201 A 1
7202 A 2
7203 A 1
7204 A 2
7205 A 1
7206 A 1
7207 A 1
7208 A 1
7209 A 2
7210 A 2
7211 A 2

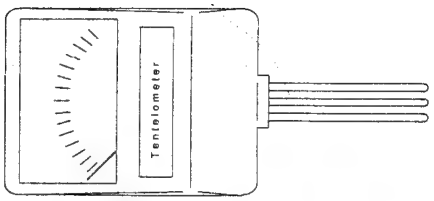
4. DRIVE ASSEMBLY

This tape deck has three motors; one providing precision drive for the scanner unit; the second providing direct drive for the capstan and belt drive for the reel tables; the third motor drives the lift and tape threading/dethreading operations.

Special features are:

Quick start
Short winding time
Automatic cleaning of video heads by cleaning roller

To obtain a high repair standard we have developped a range of service kit's. These kit's covers the spare parts which are engaged together.



Tentelometer 4822 395 90584

Tool for tapetension adjustment 4822 395 50188

4.1 Deck parts replacement

Before repairing a deck assembly the top and bottom covers should be removed.
The procedure for the removal and refitting of the following parts is described; only the lift, the scanner, the capstan motor and the A/C head are fixed by screws.
All the other deck assembly parts are held only by snap hooks.

Manual extraction of cassette:
If, after the Eject button has been pressed, the drive does not unthread and eject the cassette, the dethreading/eject operation can also be carried out manually by turning the wheel at the rear of the threading motor.

To avoid slack tape, alternate this action with the movement of the capstan motor (counter-clockwise), until the tape is completely taken into the cassette.

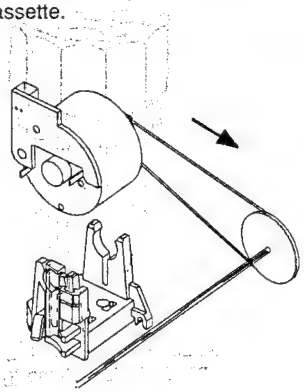
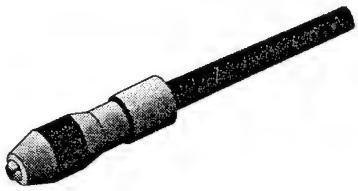
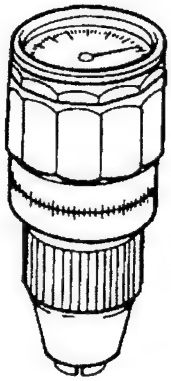


Fig. 1



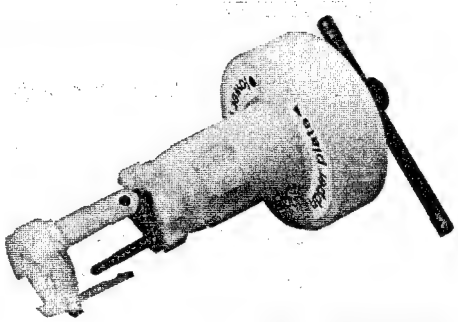
Handle 4822 256 90493



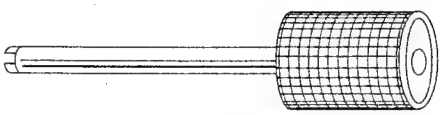
Torquemeter:
600 gf-cm 4822 395 90232
90 gf-cm 4822395 80196

IMPORTANT:
After each repair has been carried out in the drive assembly, the first operation after repairing must be to bring the cassette compartment into "eject" position by hand.

Auxiliary tools for deck adjustment:



Tool for removing the head disc 4822 395 90977



Post adjustment screwdriver 4822 395 50275

Testcassette 4822 397 30103

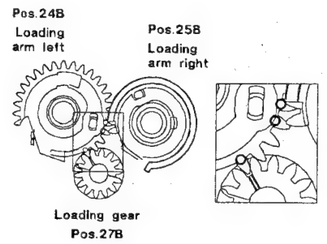
Nylon gloves 5322 395 94022

4.1.1 Deck lay out diagram

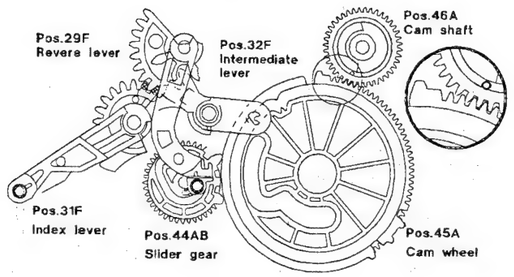
Deck in position "threaded out".

The following diagrams indicate the relative position of the gearwheels and levers when the deck is in the threaded out (cassette compartment down) position.

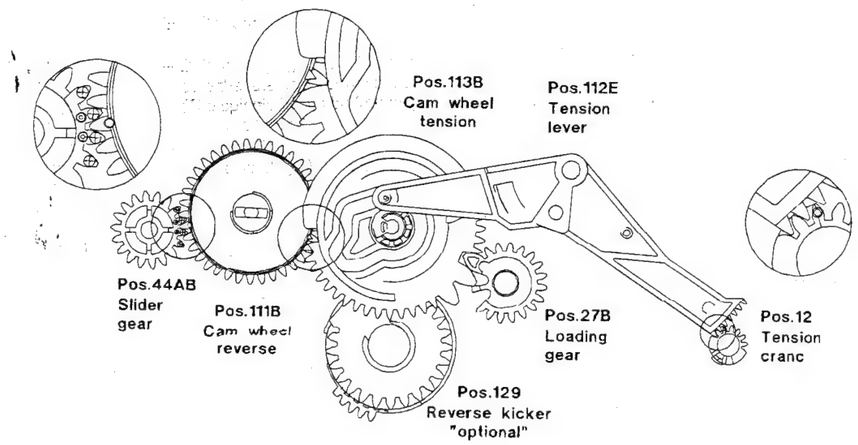
Top view



Top view



Underside view



4.1.2 The Lift

Refitting the lift compartment:
Ensure the lift compartment is down and gear A is rotated one click stop anticlockwise from the down position.
The removal and refitting of the lift can be carried out in all deck positions with the exception of "eject" (ensure that gears 103/105 are free).

To remove the lift
- Free the holding bracket (Fig. 2) by rotating it up and back from the upper end.
- Unscrew the 4 screws on the underside of the deck.
- Carefully remove the lift vertically, noting the position of the record protect operating lever.

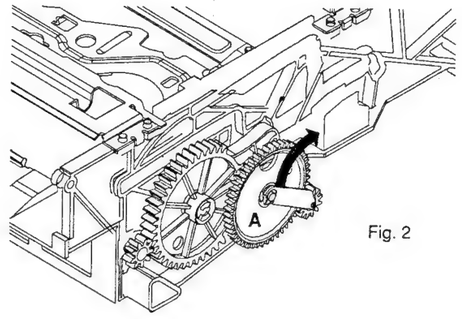


Fig. 2

4.1.3 Head disc replacement

Removal :
- Nylon gloves should be worn when handling the head disc.
- Turn the headdisc until the long hole of the rotor appears in the bigger hole of the scannermotor
- Insert the reference pin C (included with each service head disc) through the bigger hole of the lid of the scanner motor until the pin snaps in the long hole of the rotor. (Fig. 3)

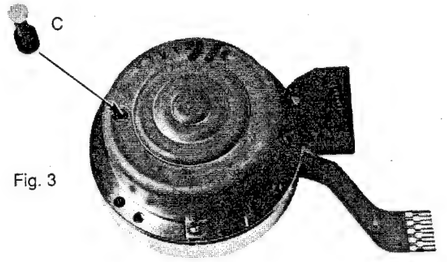


Fig. 3

Important:
Choose Installation/Removal of the upper/lower clamping element by turning and attaching the reference element to the tool. (Fig. 4)

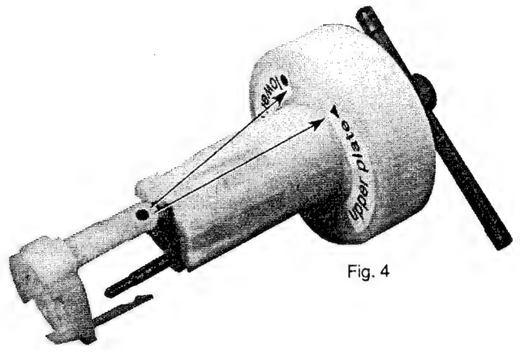


Fig. 4

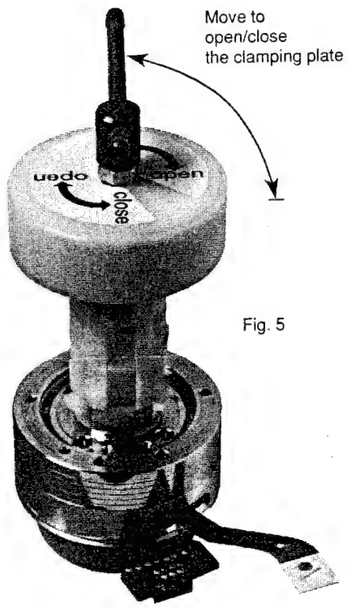


Fig. 5

- Position the tool on the upper clamping element, loosen the clamping element by turning the lever 90 degrees and remove it from the head disc. (Fig. 5)

- Prepare the tool for the lower clamping element.Position the tool on the head disc and make sure that all 3 pins are snapped in the the lower clamping element. Loosen the clamping element by turning the lever 90 degrees and remove the head disc plus the tool from the scanner spindle. (Fig.6)

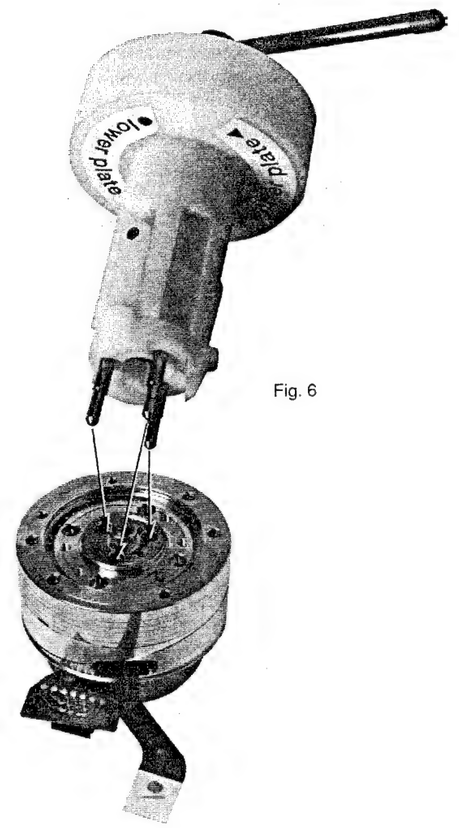


Fig. 6

Installation:

- Before carrying out the installation of the new head disc make sure that the scanner motor spindle is clean and undamaged. (The spindle has to be free of grease and must not be touched with bare hands)
- Insert the 2 Mylar foils (included with each head disc) in the head disc. (Fig.7)

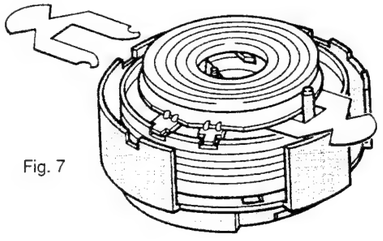


Fig. 7

– Position the tool (reference: lower clamping element) on the new headdisc (with protective cover) and loosen the lower clamping element.
– Position the head disc so that pin D of the protective cover engages in the hole of the stator (the arrow on the protective cover must point towards the scanner print). (Fig. 8)

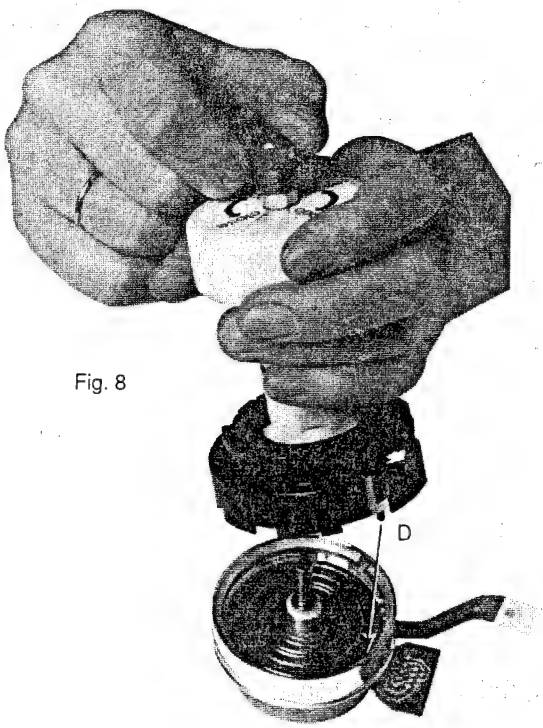


Fig. 8

– Reach the exact position through pressing the tool down with a force of 1 N. and fix the lower clamping element by turning the lever towards "close".
– Remove the tool.
– Change the tool to "upper clamping element" and position the clamping element exactly. (Fig. 9)

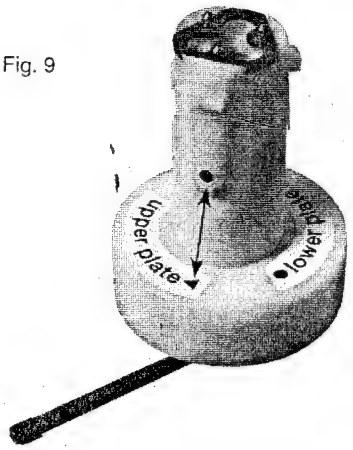


Fig. 9

– Tighten the clamping element through turning the lever towards "open".
– Position the tool planely on the head disc and fix the clamping element. (Fig.5 "close")
– Remove the protecting cap from the head disc, withdraw the two Mylar foils and remove the reference pin C.

After replacing the head disc, carry out the following adjustments and checks :

– Head switching pulse (gap position, chapter 3)
– Write current adjustments (chapter 3)
– Check tape path alignment. (see paragraph 4.2.1.)

4.1.4 A/C Head (Combi head) (Pos. 36)

– Remove fixing spring (A) (Fig. 10).
– Remove the fixing screw and replace the A/C head.
– Use a new fixing spring (included with new A/C head) for reassembly.

After the A/C head has been replaced, all adjustments described in paragraph 4.2.1.2 and paragraph 4.2.1.3 have to be carried out.

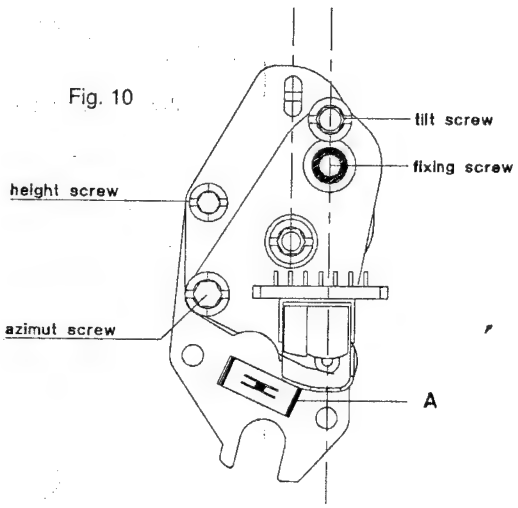


Fig. 10

4.1.5 Threading motor (Pos. 38)

– Remove the belt and disconnect the connector plug.
– Remove the threading motor from the motor supports (Fig. 11).

During reassembly ensure that the threading motor is correctly located in the front and rear supports.

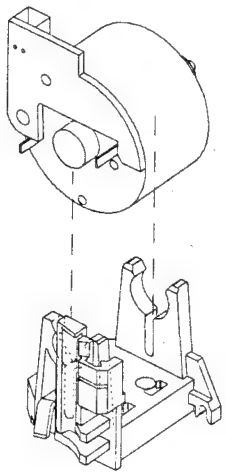


Fig. 11

4.1.6 Capstan motor (Pos. 127)

- Set the drive assy to "Eject" position.
- Remove the belt (pos.126) on the underside; then free the pin from the sensor print (see section 4.1.10). Lift sensor print part vertically (it is plug and socket connected to the capstan motor print). Move both sections of the sensor print clear of the capstan motor.
- Remove the three capstan motor fixing screws (Fig. 12) and withdraw the capstan motor downward from the drive assy.

The reassembly is carried out in reverse order. Make sure that the capstan is free of grease.

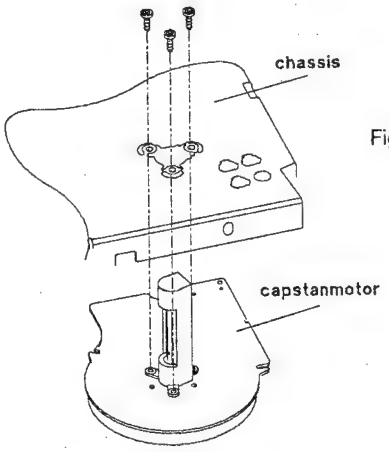


Fig. 12

4.1.7 Pressure roller (Pos. 37)

- Set the drive assy to "Eject" position.
- Unhook and remove the pressure roller tension spring.
- Release the pressure roller guide (pos. 41G) from the guide in the threading motor holder by pressing the top of the motor guide rearwards and rotating the pressure roller guide assembly clockwise by approximately a quarter of a turn.(see Fig. 13) The pressure roller and guide can now be lifted clear.

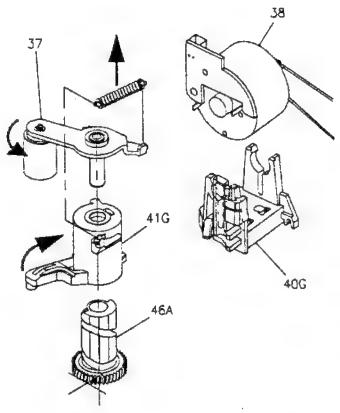
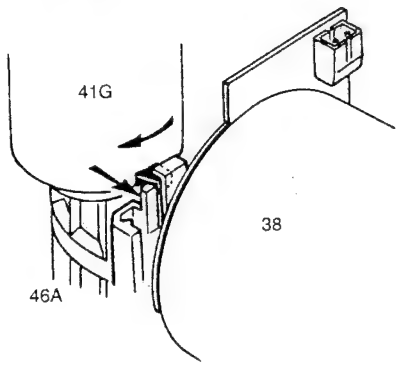


Fig. 13



Ensure that no grease from the pressure roller guide gets to the capstan or pressure roller.
The reassembly is carried out in reverse order.

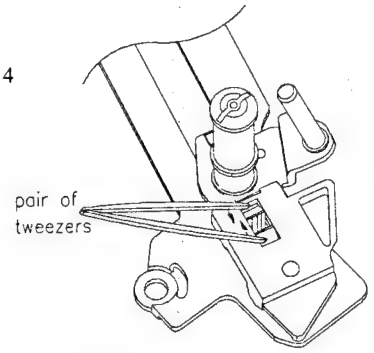
4.1.8 Roller unit right (Pos. 26)

- Set the drive assy to "Eject" position.
- Compress the two snap hooks by means of a pair of tweezers and remove the roller assy from the roller unit right (Fig. 14).
- Unhinge the loading arm right from the holding plate and push the latter towards the front of the deck to remove from the guide (right).

NOTE: During reassembly ensure the link from 25B is engaged in the hole of the holder plate 26

After replacing the roller unit (right), the tape path has to be checked, and adjusted if necessary (paragraph 4.2.1).

Fig. 14



4.1.9 Roller unit left (Pos.23)

- Set the drive assy to "Eject" position.
- Unhook the tension arm spring (pos. 11), to avoid the tension arm spring being pre-loaded.
- At the bottom side of the drive assy, partially unhinge the sensor mounting print and remove the tension lever (pos.112).
- Compress the two snap hooks by means of a pair of tweezers (Fig. 9)and remove the roller assy (A) from the plate (B).
- Unhinge the loading arm (left) from the holding plate and remove the latter downward from the drive assy through the recess in the chassis (Fig. 15).

The reassembly is carried out in reverse order.

NOTE: During reassembly
1. Place the carriage holding plate in the assembly with the half-round cutout nearest the rear of the deck.
2. When the loading arm is refitted ensure the pin on the underside of 23 is through the link of 24B.

After replacing the roller unit (left) the tape path has to be checked (paragraph 4.2.1.), and adjusted if necessary.

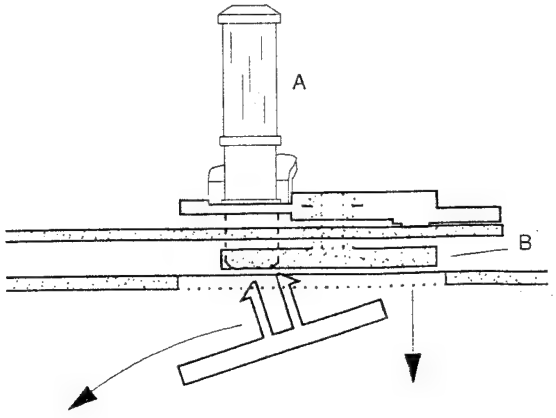


Fig. 15

4.1.10 Sensor print assy (Pos. 118)

For circuit diagram and electrical data see deck electronics (chapter 3).
If a part of the sensor print is defective the whole sensorprint has to be replaced.
Proceed as follows:
- Remove the deck assembly from the set.
- Lift the sensor print vertically, it is plug and socket connected to the capstan motor print.
- All other parts are attached by means of snap hooks and are easily freed.

Reassembly is carried out by snapping the snap hooks into place, and inserting the rivet B.

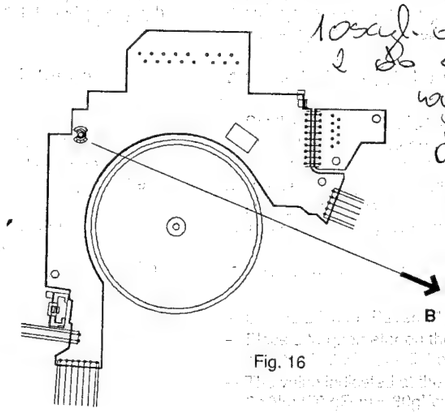


Fig. 16

1. Pressing the auto tracking button and watch the tape sync pulse move to the left in relation to the TRIV signal.
2. Note the extreme left hand position reached by the sync pulse, repeat as necessary.
3. Stop the movement of the pulse when the TRIV signal reduces to 1/2 to 2/3 maximum amplitude by pressing the normal play button.
A noisy picture (disturbances) is visible on the TV set and the CTL pulse should be to the left of the display.
The machine will retain this position in memory until an eject is carried out. This condition works only if X-distance is adjusted.

Adjustment:
Adjust the left and right roller units to make the tracking signal TRIV straight and flat as possible (Fig. 18).

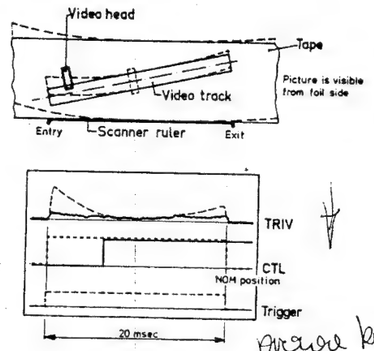


Fig. 18

4.2 Adjustments

4.2.1 Tape path

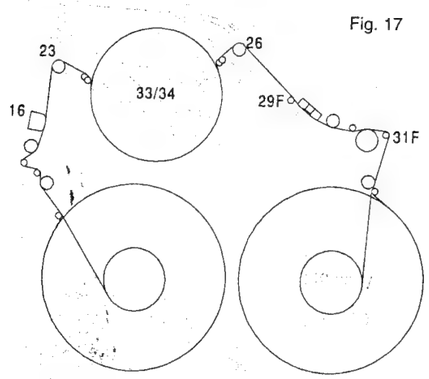


Fig. 17

4.2.1.1 Roller left unit/roller unit right

Preparation:
- Connect one input of a dual trace oscilloscope to observe the tape sync pulse CTL.The other input (DC coupled) to observe the tracking information TRIV.
- Trigger the oscilloscope externally on the head pulse HP1.
- Playback the black and white section of the alignment test tape.
- Set the deck in the condition where the video heads are running along the upper edge of the tracks only by:

4.2.1.2 A/C Combi head

Tilt angle adjustment

- Set the drive to feature mode (e.g. +7)

Adjustment **with** tape guide A1:
- By means of the tilt angle adjusting screw move the tape until the lower edge just touches the tape guide A1 (see Fig. 19) the tape must not be distorted at the lower edge (by pressing onto guide).

Adjustment **without** tape guide A1:
- By means of the tilt angle adjustment screw move over the tape until the lower edge just touches the tape guide A2 (see fig.19) (by pressing onto guide).After that turn the tilt angle adjustment screw anticlockwise for 60°- 90° (The tape must not touch guide A2).

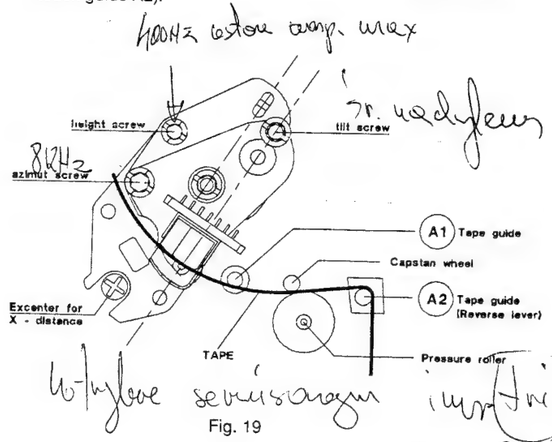


Fig. 19

Adjustment of the azimuth angle and the head height

- Connect an oscilloscope to the linear Audio output.
- Play the section of the test cassette with the audio signal 400 Hz.
- Adjust for maximum output voltage by means of the height adjustment screw
- Play the section of the test cassette with the audio signal 8 kHz.
- Adjust to maximum output voltage by means of the azimuth adjustment screw (Fig. 19).
- If necessary, repeat this procedure
- Check the tilt angle adjustment

If the tape path was completely out of adjustment or if several components in the tape path have been replaced, it is possible, that the adjustments described in paragraph 4.2.1.1 and paragraph 4.2.1.2 have to be repeated several times.

4.2.2 Adjustment of the horizontal distance (x-distance)

- Before this adjustment is carried out, insert the test cassette (start from Eject position). Call the service test program (tracking value will take up its nominal position) and press the "play" button.
- Playback the black/white part of the test cassette.)
- Display the TRIV signal on an oscilloscope (DC-coupled) and adjust for maximum voltage by means of the eccentric screw (Fig.19).

4.2.3 Brake band adjustment

- Set the drive to "Play"
- Adjust the brake band by means of adjusting tool (from the underside of the drive), until the edge of the elbow of the tape tension arm overlaps with the left inner edge of the left guide by 0.5mm (see Fig. 20)

4.2.4 Tape tension adjustment

- Play a VCR cassette (E 180) starting from the beginning of the tape.
- Measure the tape tension before the roller unit left by means of a tentelometer.
- Adjust the tension arm spring (pos.11) to a tape tension of 0,24 N ± 0,02 N (24 g ±2 g) by means of the adjustment tool (from the underside of the drive, Fig. 20).

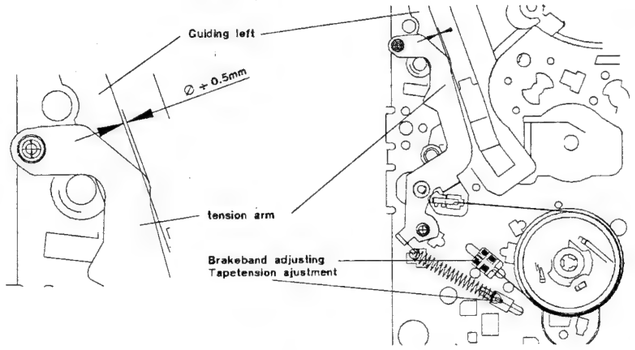
4.2.5 Friction clutch control check

- Set the drive to "Play" position.
- Place the torquemeter on the right reel.
- Turn the capstan motor to move the right reel clockwise.
- Keep turning, until the indication at the torquemeter no longer changes (Fig. 21)
- The torque has to be 10,5 mNm ± 25% (105gFcm ±25%)

4.2.6 Reverse brake control

- Set the drive to "Reverse" position.
- Place a torquemeter on the right reel and turn the latter counterclockwise, until the reel just starts to flip.
- The value indicated at the torquemeter has to be 7mNm± 3mNm (70 gFcm ± 30gFcm) (Fig. 21).

Fig. 20



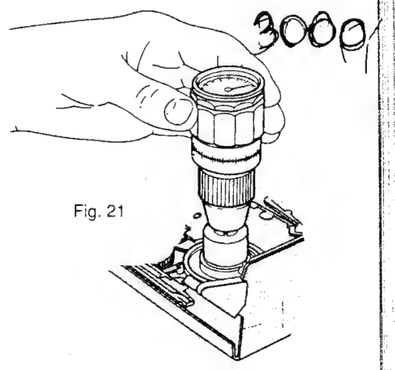
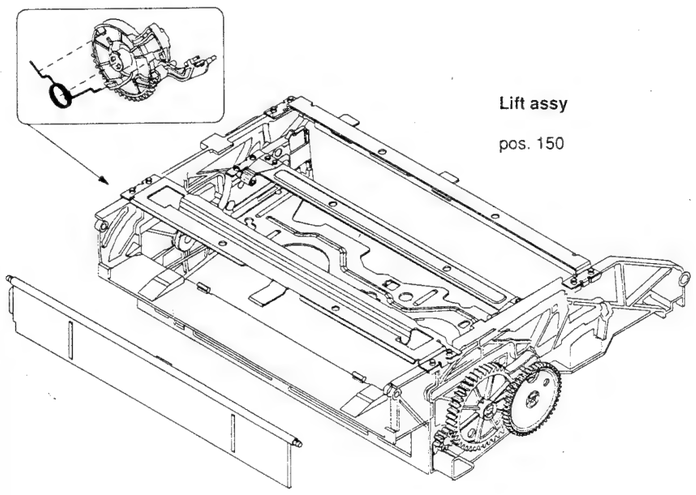


Fig. 21

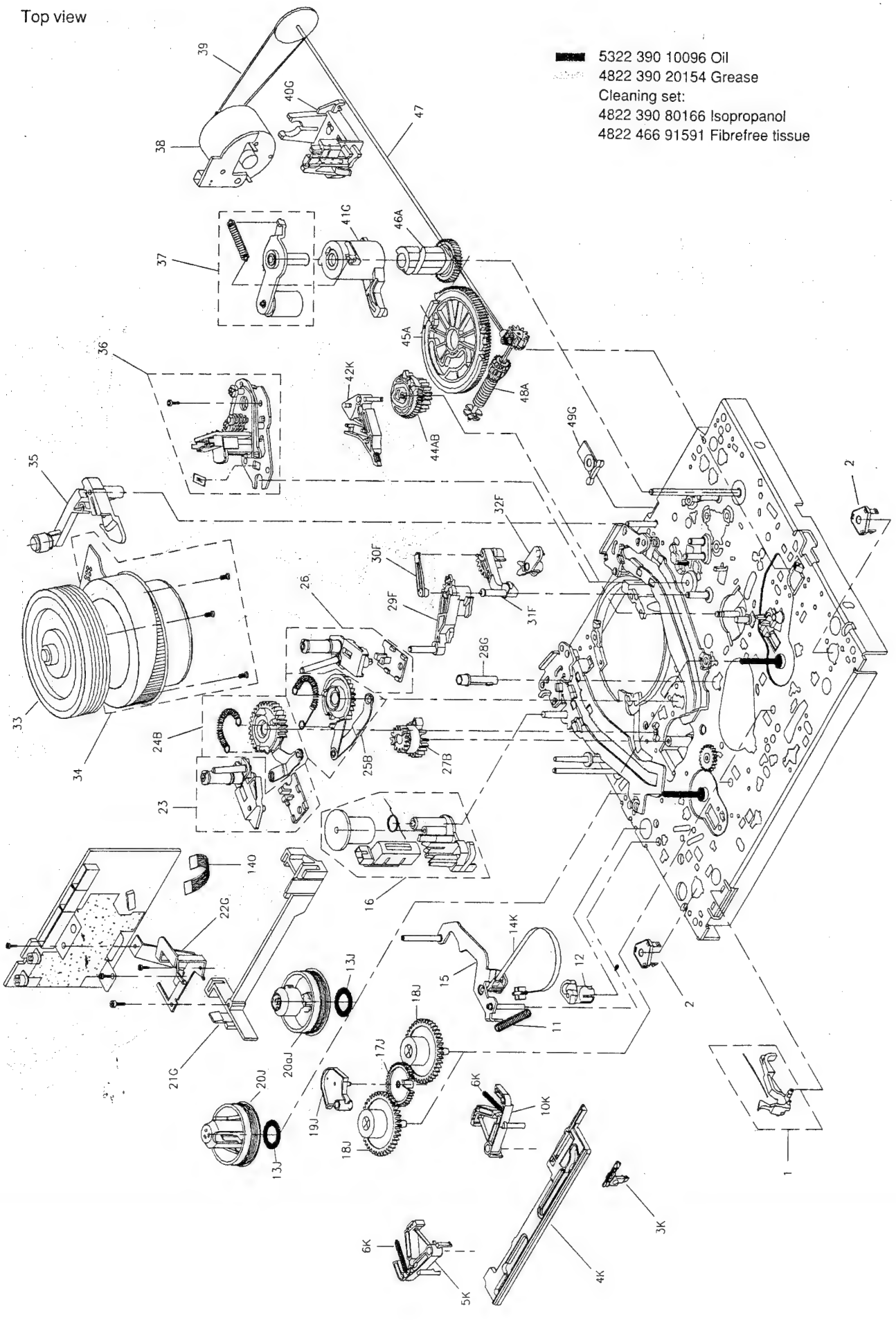


Lift assy

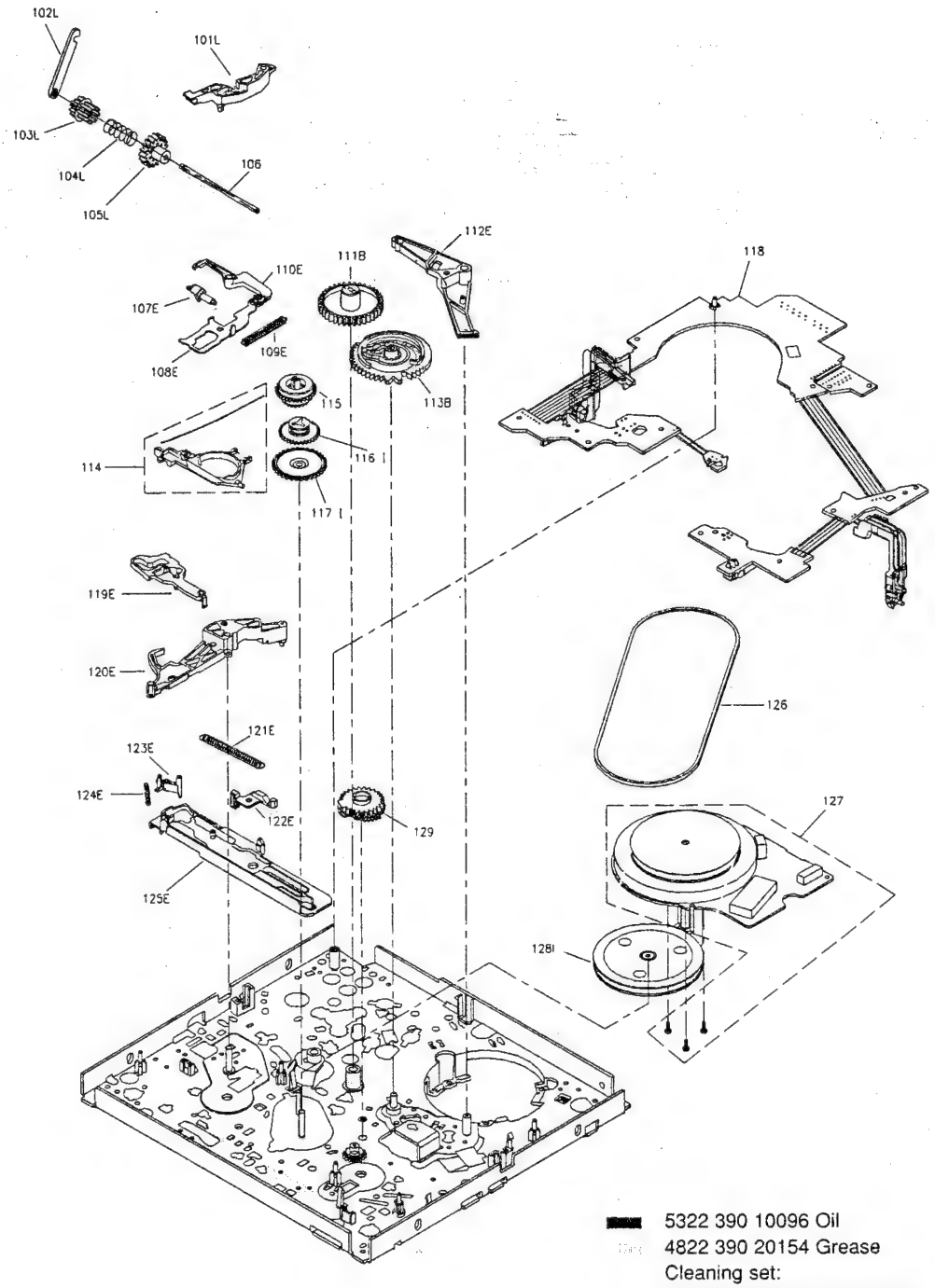
pos. 150

4.3 Exploded view

Top view



Bottom view



5322 390 10096 Oil
4822 390 20154 Grease
Cleaning set:
4822 390 80166 Isopropanol
4822 466 91591 Fibrefree tissue

4.4 Partslist

Pos.	Description	KIT's									Code number 4822
		A	B	E	F	G	I	J	K	L	
1	Rec.protection lever (with spring)										403 70546
2	Chassis mounting spring (2x)										492 71022
3	Trigger lever								K		
4	Trigger slider								K		
5	Main brake left								K		
6	Main brake spring (2x)								K		
10	Main brake right								K		
11	Tension arm spring										492 33317
12	Tension crank										403 70551
13	Slip ring							J			
14	Tension band								K		
15	Tension arm										403 70547
16	Erase head										249 40293
17	Swivelling gear							J			
18	Brake gear (2x)							J			
19	Swivelling plate							J			
20	Reel table (S)							J			
20a	Reel table (T)							J			
21	Headamplifier holder					G					
22	Bracket					G					
23	Roller unit left										528 70771
24	Loading arm left		B								
25	Loading arm right		B								
26	Roller unit right										528 70772
27	Loading gear		B								
28	Light prism					G					
29	Index lever				F						
30	Reverse clip				F						
31	Reverse lever				F						
32	Intermediate lever				F						
33	Head disc 2/0										691 20926
33	Head disc 3/0										691 20937
33	Head disc 4/0										691 20938
34	Scanner motor 2/0 (with screws)										361 21548
34	Scanner motor 3/0 (with screws)										361 21549
34	Scanner motor 4/0 (with screws)										361 10658
35	Cleaning roller										528 70773
36	A/C Head (with clip and screws)										249 10468
37	Pressure roller (with spring)										528 70774
38	Threading motor										361 21486
39	Threading belt										358 20421
40	Motor holder					G					
41	Pressure roller guide					G					
42	Reverse brake								K		
44	Slider gear	A	B								

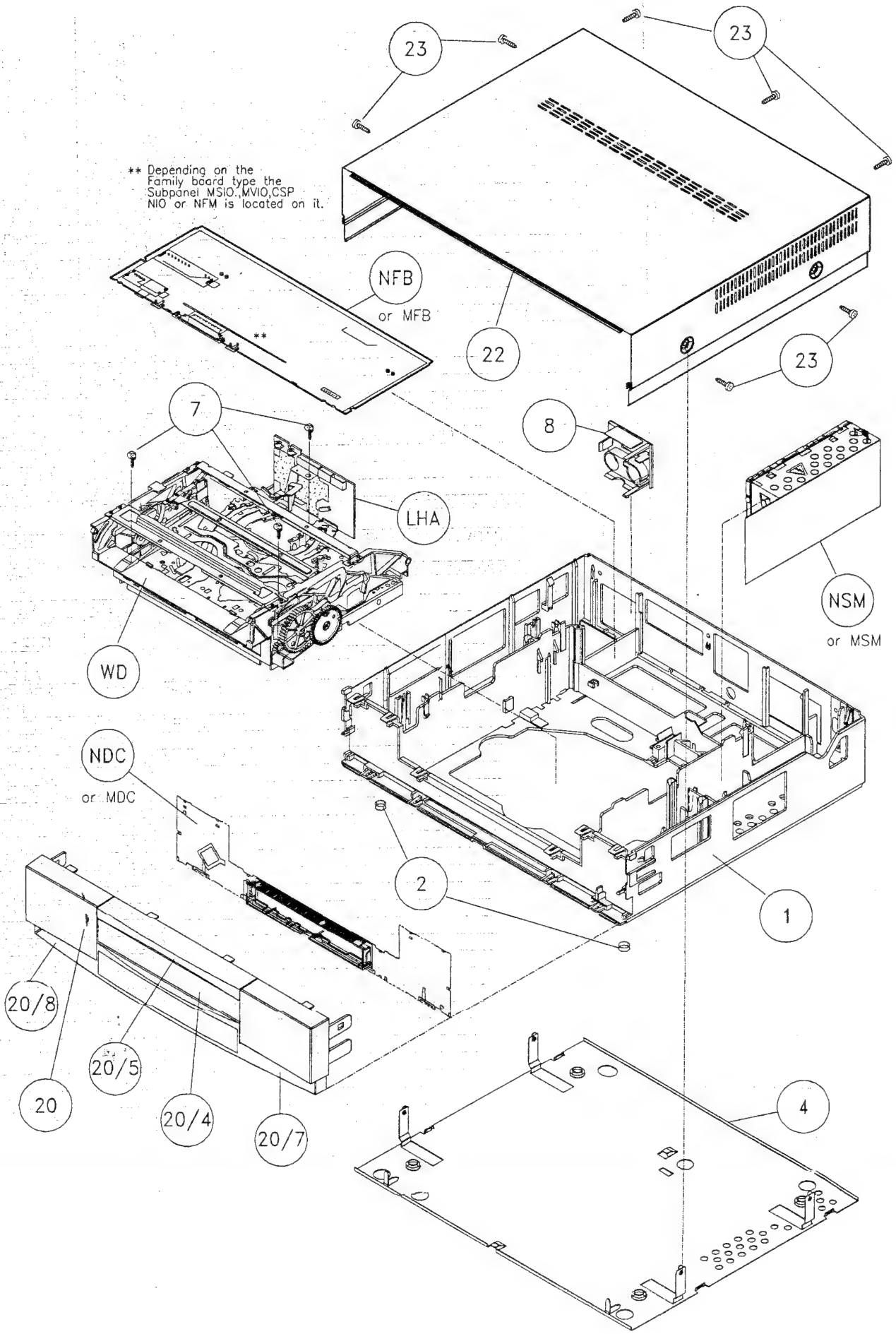
Pos.	Description	KIT's									Code number 4822
		A	B	E	F	G	I	J	K	L	
45	Cam wheel	A									
46	Cam shaft	A									
47	Pulley shaft										528 81462
48	Worm shaft	A									
49	Chassis mounting clip					G					
101	Casette loader trigger									L	
102	Clip									L	
103	Casette loader gear 1									L	
104	Casette loader spring									L	
105	Casette loader gear 2									L	
106	Spindle										535 93277
107	Pulse roller			E							
108	Pulse slider			E							
109	Pulse slider spring			E							
110	Pulse lever			E							
111	Cam wheel reverse		B								
112	Tension lever			E							
113	Cam wheel tension		B								
114	Clutch lever (with spring)										403 70549
115	Clutch										528 20736
116	Changing gear						I				
117	Double gear						I				
118	Sensor print S-VHS (with stud and rivet)										214 60155
119	Main slider lever			E							
120	Cam wheel lever			E							
121	Slider spring			E							
122	Clutch slider			E							
123	Slider lever trigger			E							
124	Slider lever spring			E							
125	Main slider			E							
126	Driving belt										358 31166
127	Capstan motor (with screws)										361 21484
128	Gear pulley						I				
129	Reverse kicker (with transmission gears) *)										522 20451
140	Flex cable										320 40287
150	Lift										443 64112
KIT	A										310 31954
KIT	B										310 31955
KIT	E										310 31958
KIT	F										310 31959
KIT	G										310 31961
KIT	I										310 31963
KIT	J										310 31996
KIT	K										310 31997
KIT	L										310 32116

For getting a high repairstandard all spare parts included in a kit have to be replaced with the exception of kit E and kit G.

*) optional

What are the benefits of service kits:
A better quality of repair (not only the defect part is replaced but also the related affected parts).
A faster repair (all the parts are already collected and are focussed on the problem).
A cheaper repair (parts are manufactured with the same parrts used for production, giving a high quality for lowest price).

EXPLODED VIEW SET



PARTSLIST

Position	12 NC 4822...	Description	Set
1	464 50961	FRAME	all sets
2	462 41806	FOOT	all sets
4	443 51235	BOTTOM	all sets
7	502 13884	SCREW 3.4 x 16	all sets
8	443 63842	COVER	VR241/02/10, VR242/02, VR243/01/13, VR347/02/10, VR247/01/02/06, VR447/02
8	443 63843	COVER	VR2410/19, VR2419/39, VR2469/39, VR3419/39, VR3469/39,VR3479/39, VR4469/39, VR4479/39, 24DV10/19, 2SB41/11, 2SB410/18, 2SB419/38, 2SB469/38, 3SB47/11, 3SB419/38, 3SB469/38
20/4	443 64156	LIFT FLAP	VR241/02, VR242/02,
20/4	443 64158	LIFT FLAP	VR241/10, VR247/01, VR247/02, VR247/06
20/4	443 64167	LIFT FLAP	VR243/01, VR243/13
20/4	443 64168	LIFT FLAP	VR347/02, VR3469/39
20/4	443 64174	LIFT FLAP	VR347/10
20/4	443 64172	LIFT FLAP	VR447/02, VR3419/39
20/4	443 64184	LIFT FLAP	VR2419/39, VR2410/19, VR2469/39
20/4	443 64187	LIFT FLAP	VR4479/39
20/4	443 64185	LIFT FLAP	2SB41/11, 2SB410/18, 2SB419/38, 2SB469/38, 3SB47/11, 24DV10/19
20/4	443 64188	LIFT FLAP	VR3479/39
20/4	443 64195	LIFT FLAP	VR4469/39
20/4	443 64199	LIFT FLAP	3SB419/38, 3SB469/38
20/5	492 70896	LEG SPRING	all sets
20/7	462 42091	FOOT RIGHT	VR347/02, VR347/10, VR3419/39, VR3469/39, VR3479/39
20/7	462 42109	FOOT RIGHT	VR447/02, VR4479/39, VR4469/39
20/8	462 42092	FOOT LEFT	VR347/02, VR347/10, VR3419/39, VR3469/39, VR3479/39
20/8	462 42111	FOOT LEFT	VR447/02, VR4479/39, VR4469/39
20/9	443 64173	FLAP (CINCH)	VR447/02
20/9	443 64186	FLAP (CINCH)	VR4479/39, VR4469/39
22	444 60853	COVER LAQUERED	VR241/02/10, VR242/02, VR243/01/13, VR247/01/02/06, VR2419/39, VR2410/19, VR2469/39
22	443 64166	COVER LAQUERED	VR347/02, VR347/10, VR3419/39, VR3469/39, VR3479/39, VR447/02, VR4479/39, VR4469/39
22	443 64194	COVER LAQUERED	2SB41/11, 2SB410/18, 2SB419/38, 2SB469/38, 3SB419/38, 3SB469/38, 3SB47/11, 24DV10/19
23	502 13173	SCREW	all sets
168	459 10923	WORDMARK SCHNEIDER	24DV10/19
168	459 10896	WORDMARK RADIOLA	2SB410/18, 2SB419/38, 2SB469/38, 3SB419/38, 3SB469/38
168	459 10912	WORDMARK SBR	2SB41/11, 3SB47/11
20	443 41367	CONTROL PANEL	VR241/02, VR242/02
20	443 41371	CONTROL PANEL	VR241/10
20	443 41375	CONTROL PANEL	VR243/01, VR243/13
20	443 41377	CONTROL PANEL	VR247/01
20	443 41382	CONTROL PANEL	VR247/02
20	443 41404	CONTROL PANEL	VR247/06
20	443 41376	CONTROL PANEL	VR347/02
20	443 41381	CONTROL PANEL	VR347/10
20	443 41379	CONTROL PANEL	VR447/02
20	443 41392	CONTROL PANEL	VR2410/19
20	443 41384	CONTROL PANEL	VR2419/39
20	443 41388	CONTROL PANEL	VR2469/39
20	443 41383	CONTROL PANEL	VR3419/39
20	443 41389	CONTROL PANEL	VR3469/39
20	443 41395	CONTROL PANEL	VR3479/39
20	443 41397	CONTROL PANEL	VR4469/39
20	443 41387	CONTROL PANEL	VR4479/39
20	443 41402	CONTROL PANEL	2SB41/11
20	443 41396	CONTROL PANEL	2SB410/18
20	443 41385	CONTROL PANEL	2SB419/38
20	443 41399	CONTROL PANEL	2SB469/38
20	443 41398	CONTROL PANEL	3SB419/38
20	443 41401	CONTROL PANEL	3SB469/38
20	443 41403	CONTROL PANEL	3SB47/11
20	443 41386	CONTROL PANEL	24DV10/19

POWER SUPPLY NSM

CONNECTORS

⚠	4822 267 31064	MAINS CONNECTOR
	4822 462 71855	COVER
	4822 265 41251	CONNECTOR 15 P.

MISCELLANEOUS

	4822 256 30514	FUSE HOLDER
1050 ⚠	4822 070 31252	FUSE T1.25A

CAPACITORS

2015	4822 121 70482	2,7	nF	100V
2023	4822 121 70462	220	nF	63V
2025	5322 121 42386	100	nF	50V
2027	5322 121 42386	100	nF	63V
2030	4822 124 80873	47	nF	25V
2040	4822 121 70481	47	nF	400V
2050 ⚠	4822 121 70163	100	nF	250V
2060 ⚠	4822 122 33284	100	pF	250V
2061 ⚠	4822 122 33284	100	pF	250V
2062 ⚠	4822 124 80872	1	nF	400V
2064 ⚠	4822 124 80872	1	nF	400V
2065 ⚠	4822 121 70163	100	nF	250V
2070 ⚠	4822 124 42104	68	µF	385V
2085	5322 121 42386	100	nF	50V
2102	4822 124 80874	47	µF	50V
2104	4822 124 80874	47	µF	50V
2110	4822 121 41856	22	nF	250V
2112	4822 121 51305	15	nF	50V
2114	4822 121 51299	1	nF	50V
2130	4822 122 31116	2,2	nF	400V
2134	4822 124 40739	680	µF	25V
2157	4822 124 80875	220	µF	25V
2185	4822 124 40739	680	µF	25V

RESISTORS

3005	4822 116 52283	4,7	kΩ	0,5W
3007	4822 117 11167	820	kΩ	0,5W
3011	4822 117 11166	360	kΩ	0,5W
3020	4822 116 52215	220	Ω	0,5W
3022	4822 116 52269	3,3	kΩ	0,5W
3027	4822 116 52233	10	kΩ	0,5W
3035	4822 116 52283	4,7	kΩ	0,5W
3040	4822 116 52233	10	kΩ	0,5W
3042	4822 116 52233	10	kΩ	0,5W
3044	4822 116 52233	10	kΩ	0,5W
3046 ⚠	4822 053 21395	3,9	MΩ	0,5W
3048 ⚠	4822 053 21395	3,9	MΩ	0,5W
3052	4822 116 52297	68	kΩ	0,5W
3054	4822 116 52297	68	kΩ	0,5W
3056	4822 116 52297	68	kΩ	0,5W
3058	4822 116 52297	68	kΩ	0,5W
3083	4822 116 52215	220	Ω	0,5W
3084	4822 116 52228	680	Ω	0,5W
3085	4822 116 52231	820	Ω	0,5W
3090	4822 100 12163	470	Ω	0,5W
3092	4822 116 52224	470	Ω	0,5W
3095	4822 116 52224	470	Ω	0,5W
3123	4822 117 11169	4,7	Ω	0,5W
3125	4822 116 52175	100	Ω	0,5W

COILS

5042	4822 157 60147	2,2 µH
5050 ⚠	4822 157 70682	MAINS FILTER
5070 ⚠	4822 146 21781	TRANSFORMER
5123	4822 157 52684	10 µH
5130	4822 157 60147	2,2 µH
5132	4822 157 53006	22 µH
5160 ⚠	4822 157 53005	
5162	4822 157 50961	22 µH
5182	4822 157 53252	22 µH
5184	4822 157 53252	22 µH

DIODES

6027	4822 130 30842	BAV21
6040	4822 130 82885	BYT52M
6070	5322 209 12018	DF08M
6100	4822 130 82885	BYT52M
6105	4822 130 82885	BYT52M
6130	4822 130 32961	BYV28-200
6155	4822 130 32961	BYV28-200
6180	4822 130 32715	SB340

TRANSISTORS & IC's

7005	*	4822 209 31528	TDA4605-3
7007		4822 209 31551	SPH4690
7035	*	4822 130 62753	IRFBC30
7080 ⚠		4822 130 83676	SOC1012T/K1150PG
7085		4822 209 33323	TL431CLPRM

* **substitute for SPH4690**

⚠.....Safety component, use only this type

POWER SUPPLY MSM

CONNECTORS

	4822 265 41251	15 pin
⚠	4822 267 31064	Mains connector

MISCELLANEOUS

⚠	4822 256 30274	Fuse holder
⚠	4822 462 71855	MSM Cover
1101 ⚠	4822 070 32002	Fuse 2A/250V

CAPACITORS

2101 ⚠	4822 121 70163	100	nF	250V
2103 ⚠	4822 122 33284	470	pF	400V
2105 ⚠	4822 122 33284	470		400V
2107 ⚠	4822 122 33284	470		400V
2108 ⚠	4822 121 70163	100	nF	250V
2112	4822 124 42104	68	µF	385V
2113 ⚠	4822 122 33284	470	pF	400V
2114	5322 121 10472	47	µF	47UF25V
2115	4822 121 42408	220	nF	63V
2116	4822 121 70162	10	nF	400V
2117	5322 121 42386	100	nF	63V
2118	4822 124 80402	1	nF	
2119	4822 121 51299	1	nF	50V
2121	5322 121 42386	100	nF	63V
2201	4822 124 80267	47	µF	50V
2204	4822 124 40739	680	µF	25V
2206	4822 124 40739	680	µF	25V
2207	4822 124 40739	680	µF	25V
2209	4822 124 80267	47	µF	50V
2210	4822 121 41856	22	nF	250V
2211	4822 121 41856	22	nF	250V
2212	5322 121 42386	100	nF	63V
2214	4822 124 40199	680	µF	16V
2215	4822 124 40199	680	µF	16V
2217	5322 121 42386	100	nF	63V

RESISTORS

3102 ⚠	4822 053 21395	3,9	MΩ	0,5W
3103 ⚠	4822 053 21395	3,9	MΩ	0,5W
3104	4822 116 52224	470	Ω	0,5W
3106 ⚠	4822 053 21225	2,2	MΩ	0,5W
3109	4822 053 30338	3,3	Ω	2,5W
3112	4822 116 52271	33	kΩ	0,5W
3119	4822 116 52271	33	kΩ	0,5W
3120	4822 116 52215	220	Ω	0,5W
3121	4822 050 13302	3,3	kΩ	0,4W
3122	4822 117 10314	680	kΩ	
3123	4822 117 10161	560	kΩ	
3124	4822 116 52269	3,3	kΩ	0,5W
3125	4822 116 52215	220	Ω	1/8W
3126	4822 116 52233	10	kΩ	0,5W
3127	4822 116 52191	33	Ω	0,5W
3129	4822 116 52284	47	kΩ	0,5W
3130	4822 116 52284	47	kΩ	0,5W
3131	4822 050 24708	4,7	Ω	0,6W
3132	4822 116 52175	100	Ω	0,5W
3203	4822 116 52224	470	Ω	0,5W
3204	4822 100 11205			
3205	4822 116 52228	680	Ω	0,5W
3206	4822 050 11002	1	kΩ	0,4W
3207	4822 116 52222	390	Ω	0,5W
3208	4822 116 52215	220	Ω	0,5W
3209	4822 116 83082	4,7	Ω	
3210	4822 116 52238	12	kΩ	0,5W

COILS

5103 ⚠	4822 218 21101	
5114 ⚠	4822 148 81322	TRANSFORMER
5203	4822 157 53006	
5204 ⚠	4822 157 53005	0,33 µH
5207	4822 157 53252	22 µH
5209	4822 157 53252	22 µH
5210	4822 157 53252	22 µH

DIODES

6110	4822 130 80858	1N5062
6111	4822 130 80858	1N5062
6112	4822 130 80858	1N5062
6113	4822 130 80858	1N5062
6114	4822 130 80858	1N5062
6115	4822 130 83307	UG06B
6116	4822 130 30621	1N4148
6201	4822 130 83121	BYD73C
6203	4822 130 81516	MUR410
6204	4822 130 81516	MUR410
6206	4822 130 83121	BYD73C
6210	4822 130 32715	SB340

TRANSISTORS & IC's

7105		4822 209 31551	SPH4690
7110	*	4822 209 31528	TDA4605-3
7135	*	4822 130 62753	BUZ90A
		substitute for SPH4690 (IC7105)	
7210 ⚠		4822 209 32126	SOC 1012T
7253		4822 209 81397	TL431CLPST

⚠.....Safety component, use only this type

OPERATING PANELS MDCP3/VPT, NDCP2/UG, NDCB1/UG, NDCB1/PECO

CONNECTORS

	4822 265 30988	15 pin
	4822 265 30991	Display holder
	4822 265 92023	Display holder
		only for Display 14-BT-28GK,15-MT-63GK
	4822 276 11349	Keys

MISCELLANEOUS

1001	5322 242 73697	Crystal 8 MHz
1002	4822 242 72892	Crystal 32,768 kHz

CAPACITORS

2003	4822 122 33847	10	pF	50V	
2004	4822 122 10462	15	pF		
2005	4822 125 50412	7,5	pF		
2010	4822 121 51387	10	nF	16V	
2020	4822 124 80229	22	µF	16V	
2030	4822 121 51387	10	nF	16V	
2031	4822 121 42408	220	nF	63V	
2037	4822 121 51387	10	nF		
2051	5322 121 42386	100	nF	63V	
2052	4822 121 42408	220	nF		
2999	4822 124 80238	470	µF	6,3V	only for ECO

RESISTORS

3001	4822 116 52175	100	Ω	0,5W	
3002	4822 116 52175	100	Ω	0,5W	
3006	4822 116 52175	100	Ω	0,5W	
3007	4822 116 52175	100	Ω	0,5W	
3011	4822 116 52233	10	kΩ	0,5W	
3012	4822 116 52233	10	kΩ	0,5W	
3028	4822 116 52215	220	Ω	1/8W	
3029	4822 116 52233	10	kΩ	0,5W	
3030	4822 116 52257	22	kΩ	0,5W	
3031	4822 116 52283	4,7	kΩ	0,5W	
3032	4822 050 11002	1	kΩ	0,4W	
3033	4822 116 52256	2,2	kΩ	0,5W	
3034	4822 116 52283	4,7	kΩ	0,5W	
3035	4822 116 52233	10	kΩ	0,5W	
3036	4822 116 52233	10	kΩ	0,5W	
3037	4822 116 52257	22	kΩ	0,5W	
3050	4822 116 52256	2,2	kΩ	0,5W	
3053	4822 050 24708	4,7	Ω	0,6W	
3053	4822 116 52182	15	Ω	0,6W	
		only for Display 14-BT-28GK,15-MT-63GK			
3300	4822 116 52233	10	kΩ	0,5W	
3301	4822 116 52233	10	kΩ	0,5W	
3302	4822 116 52233	10	kΩ	0,5W	
3400	4822 116 52263	2,7	kΩ	0,5W	**
3401	4822 116 52263	2,7	kΩ	0,5W	**
3402	4822 116 52263	2,7	kΩ	0,5W	**
3403	4822 116 52263	2,7	kΩ	0,5W	**
		** only for MDCP./., NDCP./.			

COILS

5000	4822 157 52286	22 µH

DIODES

6010	4822 130 30621	1N4148
6011	4822 130 30621	1N4148
6012	4822 130 30621	1N4148
6031	4822 130 30621	1N4148
6032	4822 130 30621	1N4148
6050	4822 130 34197	BZX79-C12
6050	4822 130 30862	BZX79-C9V1
		only for Display 14-BT-28GK,15-MT-63GK
6099	4822 130 31983	BAT85

TRANSISTORS & IC's

7030	5322 130 60068	BC558C
7031	4822 130 40937	BC548B
7101	4822 209 33355	TMP87CH70AF NDCP2-1U
		only for NDCP2/UG
7101	4822 209 32296	TMP87CH70AF MDCP3-1U
		only for MDCP3/VPT, MDCB1/VPT
7101	4822 209 33494	TMP87CH70AF NDCQ1-2P
		only for NDCB1/PECO
7101	4822 209 33489	TMP87CK70AF NDCB2-1U
		only for NDCB1/UG
7102	4822 130 91144	16-MT-44GK10R
		only for NDCP2/UG
7102	4822 130 91213	14-BT-28GK
		only for MDCP3/VPT, MDCB1/P, NDCB1/PECO
7102	4822 130 91363	15-MT-63GK
		only for NDCB1/UG
7103	4822 214 33534	IR-receiver TFMO-4036MM
7103	4822 212 30842	IR-receiver TFMS5360
		only for NDCB1/PECO

⚠.....Safety component, use only this type

OPERATING PANEL NDCP4/UBG

CONNECTORS

	4822 267 41161	4 pin
	4822 267 41163	5 pin
	4822 267 51281	15 pin
	4822 256 92072	IR-holder
	4822 265 30991	Display holder
	4822 276 11349	Keys

MISCELLANEOUS

1001	5322 242 73697	Crystal 8.00 MHz
1002	5322 242 73682	Crystal 32,768 kHZ
1104	4822 267 31773	HSJ1452 Edit
1106	4822 267 31775	JPJ2022 chinch YELLO
1107	4822 267 31774	JPJ2022 chinch WHITE

CAPACITORS

2003	4822 122 31971	10	pF	63V	
2004	4822 122 32504	15	pF	63V	
2005	4822 125 50412	7,5	pF		
2010	4822 122 32442	10	nF	50V	
2011	4822 124 42152	220	µF	16V	
2020	4822 124 80729	22	µF	16V	
2030	4822 122 32442	10	nF	50V	
2031	4822 121 42408	220	nF	63V	
2037	4822 122 32442	10	nF	50V	
2051	4822 122 31947	100	nF	63V	
2052	4822 126 13219	100	nF	25V	
2401	4822 122 31727	470	pF	63V	
2403	4822 121 42408	220	nF	63V	
2999	4822 124 80238	200	µF	5,5V	

RESISTORS

3011	4822 051 10103	10	kΩ	0,25W
3012	4822 051 10472	4,7	kΩ	0,25W
3028	4822 051 10221	220	Ω	0,25W
3029	4822 051 10103	10	kΩ	0,25W
3030	4822 051 10223	22	kΩ	0,25W
3031	4822 051 10472	4,7	kΩ	0,25W
3032	4822 051 10102	1	kΩ	0,25W
3033	4822 051 20222	2,2	kΩ	0,1W
3034	4822 051 10472	4,7	kΩ	0,25W
3035	4822 051 10103	10	kΩ	0,25W
3036	4822 051 10103	10	kΩ	0,25W
3037	4822 051 10223	22	kΩ	0,25W
3050	4822 116 52256	2,2	kΩ	0,5W
3053	4822 051 10478	4,7	Ω	0,25W
3300	4822 051 10103	10	kΩ	0,25W
3301	4822 051 10103	10	kΩ	0,25W
3302	4822 051 10103	10	kΩ	0,25W
3401	4822 116 52201	75	Ω	0,5W
3402	4822 051 10105	1	MΩ	0,25W
3502	4822 051 10471	470	Ω	0,25W
3901	4822 051 10008	0	Ω	0,25W
3903	4822 051 10008	0	Ω	0,25W

COILS

5000	4822 157 52286	22 µH
5001	4822 157 52285	6,8 µH

DIODES

6010	4822 130 30621	1N4148
6011	4822 130 30621	1N4148
6012	4822 130 30621	1N4148
6031	4822 130 30621	1N4148
6032	4822 130 30621	1N4148
6050	4822 130 34197	BZX79-B12
6099	4822 130 31983	BAT85
6401	4822 130 30621	1N4148
6501	4822 130 34278	BZX79-B6V8
6502	4822 130 34278	BZX79-B6V8

TRANSISTORS & IC's

7030	4822 130 42513	BC858C
7031	5322 130 41982	BC848B
7101	4822 209 33495	TMP87CN71F NDCP4-1U
7102	4822 130 91144	FIP16BM10R
7103	4822 212 30842	TFMS5360

⚠.....Safety component, use only this type

FAMILY BOARD N1 N2

CONNECTORS

4822 267 51163	10 pin	
4822 267 51281	15 pin	
4822 267 51281	15 pin	
4822 267 51164	16 pin	not for ECO
4822 267 51281	15 pin	only for ECO
4822 267 41062	6 pin	
4822 265 30989	3 pin	
4822 267 60333	Scart plug	
4822 265 30987	7 pin	
4822 267 40696	3 pin	

MISCELLANEOUS

1400 ⚠	4822 071 56301	Fuse 630mA	
1401	4822 242 73809	Crystal 10 MHz	
1402 ⚠	4822 071 58009	Fuse 80mA	
1500	4822 214 33719	MDLK6D915A	for PAL BG
1500	4822 214 33773	MDLK6E917A	for PAL BG/SEC DK
1500	4822 214 33718	MDLK6B776A	for PAL I
1501	4822 157 60192	Coil	not for PAL I & ECO
1601	4822 242 81067	Crystal 4.433 619 MC	
1602 ⚠	4822 071 58001	Fuse 800mA	
1603	4822 320 40168	Delay line	
1701	4822 116 90869	Resistor network	only for VST
1720	4822 210 10498	UV917	for VST & PAL BG
1720	4822 210 10498	UV917	for VST & PAL BG/SEC DK
1720	4822 210 10498	UV917	for VST & PAL I-VHF (Irland)
1720	4822 210 10452	UV943	for VST & PAL I
1720	4822 210 10392	UV916E	for PLL & PAL BG
1720	4822 210 10392	UV916E	for PLL & PAL BG/SEC DK
1720	4822 210 10392	UV916E	for PLL & PAL I-VHF (Irland)
1720	4822 210 10393	UV944C	for PLL & PAL I
1721	4822 242 81261	OFWG1966M	for PAL BG
1721	4822 242 72197	OFWK2950M	for PAL BG/SEC DK
1721	4822 242 70936	OFWJ1952M	for PAL I
1722	4822 242 72586	TPS5,5MB	for PAL BG
1722	4822 242 81572	TPS6,0MB	for PAL I
1722	4822 242 72586	TPS5,5MB	for PAL BG/SEC DK
1723	4822 242 72914	SFSH5,5MDB	not for PAL I
1724	4822 242 81299	SFSH6,5MDB	for PAL BG/SEC DK
1724	4822 242 70279	SFE6,0MB	for PAL I

CAPACITORS

2000	5322 122 32659	33	pF	50V	
2001	4822 122 33514	68	pF	50V	
2002	4822 126 10326	180	pF	63V	
2003	4822 122 33575	220	pF	50V	
2004	5322 122 32965	18	pF	50V	
2009	4822 124 40248	10	µF	63V	
2010	5322 122 34123	1	nF	50V	
2011	4822 124 40248	10	µF	63V	
2012	4822 124 80705	1	µF	50V	
2013	4822 122 33172	390	pF	50V	
2014	5322 122 32452	47	pF	63V	
2015	4822 122 33177	10	nF	50V	
2017	5322 122 31946	27	pF	50V	
2018	5322 122 32531	100	pF	50V	
2019	5322 122 33538	150	pF	63V	
2020	5322 122 32531	100	pF	50V	
2021	4822 124 41643	100	µF	16V	
2023	4822 124 22269	100		16V	
2024	4822 124 40433	47	µF	25V	
2025	4822 126 10002	100	nF	25V	
2026	5322 122 32531	100	pF	50V	
2027	4822 122 33515	82	pF	63V	
2028	5322 122 33861	120	pF	50V	
2029	5322 122 32452	47	pF	63V	
2032	4822 124 40242	1	µF	63V	
2033	5322 122 33861	120	pF	50V	
2034	5322 122 32654	22	nF	63V	
2035	4822 124 40242	1	µF	63V	
2038	4822 122 33514	68	pF	50V	
2039	5322 122 33538	150	pF	63V	
2040	4822 124 22826	10	µF	16V	
2041	4822 124 40248	10	µF	63V	
2042	4822 126 10002	100	nF	25V	
2043	5322 122 32654	22	nF	63V	
2045	4822 121 51387	10	nF	16V	
2046	4822 124 40242	1	µF	63V	
2047	4822 124 40242	1	µF	63V	
2048	4822 122 33797	47	nF	50V	
2050	5322 122 31946	27	pF	50V	
2052	4822 124 40248	10	µF	63V	
2055	4822 126 10002	100	nF	25V	
2056	4822 122 33797	47	nF	50V	
2057	4822 122 33797	47	nF	50V	
2058	4822 124 41576	2,2	µF	50V	
2059	4822 124 40242	1	µF	63V	
2061	5322 122 34123	1	nF	50V	
2063	5322 122 34123	1	nF	50V	
2064	4822 122 31947	100	nF	63V	
2065	4822 122 33514	68	pF	50V	
2066	5322 122 31946	27	pF	50V	
2067	5322 122 32659	33	pF	50V	
2068	4822 122 33514	68	pF	50V	
2069	5322 122 31946	27	pF	50V	
2070	4822 122 33515	82	pF	63V	
2071	5322 122 32452	47	pF	63V	
2072	5322 122 34123	1	nF	50V	
2079	4822 122 33177	10	nF	50V	
2080	5322 122 34123	1	nF	50V	
2082	4822 124 41576	2,2	µF	50V	only for PAL BG/SEC DK
2083	4822 124 41576	2,2	µF	50V	only for PAL BG/SEC DK
2084	4822 124 41577	4,7	µF	50V	only for PAL BG/SEC DK
2085	4822 124 41643	100	µF	16V	only for PAL BG/SEC DK
2086	5322 122 34123	1	nF	50V	only for PAL BG/SEC DK
2087	5322 122 31863	330	pF	50V	
2088	4822 122 31947	100	nF	63V	
2090	4822 126 10002	100	nF	25V	
2095	5322 122 32452	47	pF	63V	
2096	5322 122 32452	47	pF	63V	
2099	5322 122 34123	1	nF	50V	
2100	4822 122 31825	27	pF	63V	
2101	5322 122 33861	120	pF	50V	
2106	5322 122 32481	15	pF	50V	
2107	4822 122 33177	10	nF	50V	
2211	5322 122 32452	47	pF	63V	only for LP
2300	5322 122 31946	27	pF	50V	only for VPS
2301	4822 122 33342	33	nF	63V	only for VPS
2302	4822 126 10002	100	nF	25V	only for VPS
2303	4822 122 33177	10	nF	50V	only for VPS
2402	4822 124 40433	47	µF	25V	
2403	4822 126 10002	100	nF	25V	
2404	5322 126 10223	4,7	nF	63V	
2405	5322 122 32658	22	pF	50V	
2406	5322 122 32658	22	pF	50V	
2407	4822 126 10002	100	nF	25V	
2408	4822 126 10002	100	nF	25V	
2409	4822 122 33177	10	nF	50V	
2410	4822 124 40433	47	µF	25V	
2411	5322 126 10223	4,7	nF	63V	
2412	4822 124 41643	100	µF	16V	
2413	5322 122 34123	1	nF	50V	
2414	4822 122 31981	33	nF	50V	
2415	4822 122 31947	100	nF	63V	
2416	4822 126 10002	100	nF	25V	
2417	4822 124 40433	47	µF	25V	
2418	4822 122 33177	10	nF	50V	
2419	5322 126 10223	4,7	nF	63V	
2420	4822 124 40433	47	µF	25V	
2423	4822 122 31947	100	nF	63V	
2500	5322 126 10223	4,7	nF	63V	

⚠.....Safety component, use only this type

FAMILY BOARD N1 N2

2503	5322 122 32268	470	pF	50V	
2504	5322 122 32268	470	pF	50V	
2506	5322 122 32268	470	pF	50V	
2507	4822 124 40433	47	µF	25V	
2508	4822 122 33177	10	nF	50V	
2600	5322 122 34123	1	nF	50V	
2601	5322 122 31865	1,5	nF	63V	only for LP
2602	4822 126 10002	100	nF	25V	only for LP
2603	5322 122 34123	1	nF	50V	
2604	4822 122 33177	10	nF	50V	
2605	4822 124 40433	47	µF	25V	
2606	4822 126 10002	100	nF	25V	
2607	4822 126 10002	100	nF	25V	
2608	4822 122 33216	270	pF	50V	
2609	4822 124 40433	47	µF	25V	
2611	4822 124 40433	47	µF	25V	
2612	5322 122 32654	22	nF	63V	only for LP
2613	4822 122 33177	10	nF	50V	
2614	4822 124 40242	1	µF	63V	
2615	4822 124 40433	47	µF	25V	
2616	4822 124 40433	47	µF	25V	
2617	4822 124 40433	47	µF	25V	
2618	5322 122 31863	330	pF	50V	
2619	4822 124 40433	47	µF	25V	
2620	4822 121 43526	47	nF	250V	
2621	5322 122 34123	1	nF	50V	
2622	5322 121 42489	33	nF	250V	
2623	4822 122 33177	10	nF	50V	
2630	5322 122 32268	470	pF	50V	
2700	4822 122 32927	220	nF	50V	only for VST
2701	4822 126 10002	100	nF	25V	only for VST
2702	5322 122 32654	22	nF	63V	only for VST
2703	4822 126 10002	100	nF	25V	
2704	4822 122 33177	10	nF	50V	only for VST
2705	4822 122 33177	10	nF	50V	only for VST
2707	4822 126 10002	100	nF		only for PLL
2722	4822 126 10002	100	nF	25V	
2723	4822 124 41596	22	µF	50V	
2724	4822 124 40248	10	µF	63V	
2725	4822 124 41576	2,2	µF	50V	
2726	4822 122 31947	100	nF	63V	
2727	4822 126 10002	100	nF	25V	
2728	4822 126 10002	100	nF	25V	
2729	4822 124 41576	2,2	µF	50V	
2730	4822 124 41407	0,47	µF	63V	only for VST
2732	4822 124 41643	100	µF	16V	
2733	4822 126 10002	100	nF	25V	only for VST
2750	4822 124 40246	4,7	µF	63V	
2760	4822 122 32927	220	nF	50V	

RESISTORS

3001	4822 051 20471	470	Ω	0,1W	
3008	4822 051 20223	22	kΩ	0,1W	
3010	4822 100 11842	4,7	kΩ		
3017	4822 051 20103	10	kΩ	0,1W	
3018	4822 100 11842	4,7	kΩ		
3019	4822 051 20682	6,8	kΩ	0,1W	
3020	4822 100 11842	4,7	kΩ		
3021	4822 051 20272	2,7	kΩ	0,1W	
3022	4822 051 20821	820	Ω	0,1W	
3023	4822 051 10102	1	kΩ	0,25W	
3025	4822 051 20104	100	kΩ	0,1W	
3026	4822 051 20472	4,7	kΩ	0,1W	
3027	4822 051 20681	680	Ω	0,1W	
3028	4822 051 20472	4,7	kΩ	0,1W	
3029	4822 051 20472	4,7	kΩ	0,1W	
3030	4822 051 20222	2,2	kΩ	0,1W	
3031	4822 051 20333	33	kΩ	0,1W	
3033	4822 051 10102	1	kΩ	0,25W	
3034	4822 051 20222	2,2	kΩ	0,1W	
3036	4822 051 20392	3,9	kΩ	0,1W	
3037	4822 051 20122	1,2	kΩ	0,1W	
3038	4822 051 20392	3,9	kΩ	0,1W	
3039	4822 100 11843	10	kΩ		
3040	4822 051 20222	2,2	kΩ	0,1W	
3041	4822 051 20472	4,7	kΩ	0,1W	
3043	4822 051 20561	560	Ω	0,1W	
3044	4822 051 10102	1	kΩ	0,25W	
3045	4822 051 20472	4,7	kΩ	0,1W	
3046	4822 051 20222	2,2	kΩ	0,1W	
3051	4822 051 20105	1	MΩ	0,1W	
3052	4822 051 20822	8,2	kΩ	0,1W	
3054	4822 116 52289	5,6	kΩ	0,5W	
3055	4822 051 20821	820	Ω	0,1W	
3062	4822 051 20182	1,8	kΩ	0,1W	
3063	4822 051 20271	270	Ω	0,1W	
3064	4822 051 20561	560	Ω	0,1W	
3065	4822 051 10102	1	kΩ	0,25W	
3066	4822 051 20122	1,2	kΩ	0,1W	
3067	4822 051 20391	390	Ω	0,1W	
3068	4822 051 10102	1	kΩ	0,25W	
3069	4822 051 20561	560	Ω	0,1W	
3070	4822 051 20391	390	Ω	0,1W	
3071	4822 051 20681	680	Ω	0,1W	
3072	4822 051 20271	270	Ω	0,1W	
3073	4822 051 10102	1	kΩ	0,25W	
3075	4822 051 20471	470	Ω	0,1W	
3076	4822 116 52219	330	Ω	0,5W	
3077	4822 051 20183	18	kΩ	0,1W	
3078	4822 051 20183	18	kΩ	0,1W	
3085	4822 051 20223	22	kΩ	only for PAL BG/SEC DK	
3086	4822 051 20821	820	Ω	only for PAL BG/SEC DK	
3087	4822 051 20105	1	MΩ	only for PAL BG/SEC DK	
3088	4822 051 20223	22	kΩ	only for PAL BG/SEC DK	
3089	4822 050 11002	1	kΩ	0,4W	
3090	4822 051 10102	1	kΩ	0,25W	
3091	4822 051 20562	5,6	kΩ	0,1W	
3092	4822 051 20332	3,3	kΩ	0,1W	
3093	4822 051 20152	1,5	kΩ	0,1W	
3094	4822 051 20222	2,2	kΩ	0,1W	
3096	4822 100 11843	10	kΩ	0,1W	
3097	4822 051 20332	3,3	kΩ	0,1W	
3099	4822 100 11877	2,2	kΩ	0,1W	
3100	4822 050 11002	1	kΩ	0,4W	
3104	4822 051 20472	4,7	kΩ	0,1W	
3105	4822 051 20122	1,2	kΩ	0,1W	
3106	4822 051 20271	270	Ω	0,1W	
3109	4822 051 20561	560	Ω	0,1W	
3111	4822 051 20471	470	Ω	0,1W	
3112	4822 051 20222	2,2	kΩ	0,1W	
3114	4822 051 20103	10	kΩ	0,1W	
3116	4822 051 20123	12	kΩ	0,1W	
3117	4822 051 20183	18	kΩ	0,1W	
3119	4822 051 20101	100	Ω	0,1W	
3121	4822 051 10102	1	kΩ	only for PAL BG/SEC DK	
3128	4822 051 20223	22	kΩ	0,1W	
3132	4822 051 20681	680	Ω	0,1W	
3135	4822 051 20104	100	kΩ	0,1W	
3137	4822 051 10102	1	kΩ	0,25W	
3300	4822 051 20332	3,3	kΩ	0,1W	only for VPS
3301	4822 051 20682	6,8	kΩ	0,1W	only for VPS
3302	4822 051 20105	1	MΩ	0,1W	only for VPS
3303	4822 051 20104	100	kΩ	0,1W	only for VPS
3304	4822 051 20105	1	MΩ	0,1W	only for VPS
3305	4822 051 20101	100	Ω	0,1W	only for VPS
3306	4822 051 20105	1	MΩ	0,1W	only for VPS
3307	4822 051 20562	5,6	kΩ	0,1W	only for VPS
3308	4822 051 20101	100	Ω	0,1W	only for VPS
3309	4822 051 20101	100	Ω	0,1W	only for VPS
3400	4822 050 11002	1	kΩ	0,4W	
3402	4822 051 20472	4,7	kΩ	0,1W	
3403	4822 051 10102	1	kΩ	0,25W	
3404	4822 051 20472	4,7	kΩ	0,1W	
3406	4822 051 20158	1,5	Ω	0,1W	
3407	4822 051 20158	1,5	Ω	0,1W	
3408	4822 051 20103	10	kΩ	0,1W	not for ECO
3410	4822 116 52199	68	Ω	0,5W	
3411	4822 116 52199	68	Ω	0,5W	
3412	4822 051 20472	4,7	kΩ	0,1W	
3413	4822 051 10102	1	kΩ	0,25W	
3415	4822 050 11002	1	kΩ	0,4W	
3416	4822 116 52234	100	kΩ	0,5W	

⚠.....Safety component, use only this type

FAMILY BOARD N1 N2

3417	4822 116 52283	4,7	kΩ	0,5W	
3418	4822 051 10333	33	kΩ	0,25W	
3419	4822 051 20472	4,7	kΩ	0,1W	
3420	4822 051 20471	470	Ω	0,1W	only for LP
3421	4822 051 10101	100	Ω	0,25W	not for LP
3422	4822 051 10102	1	kΩ	0,25W	
3423	4822 051 20182	1,8	kΩ	0,1W	
3424	4822 051 20682	6,8	kΩ	0,1W	
3425	4822 051 20822	8,2	kΩ	0,1W	
3426	4822 051 20562	5,6	kΩ	0,1W	
3427	4822 051 10102	1	kΩ	0,25W	
3428	4822 116 52283	4,7	kΩ	0,5W	
3429	4822 051 20472	4,7	kΩ	0,1W	
3430	4822 051 20471	470	Ω	0,1W	
3431	4822 051 10102	1	kΩ	0,25W	
3432	4822 050 11002	1	kΩ	0,4W	
3433	4822 051 20103	10	kΩ	0,1W	
3434	4822 116 52257	22	kΩ	0,5W	
3435	4822 051 20823	82	kΩ	0,1W	
3436	4822 051 20223	22	kΩ	0,1W	
3437	4822 051 20103	10	kΩ	0,1W	
3438	4822 051 20392	3,9	kΩ	0,1W	
3439	4822 051 10223	22	kΩ	0,25W	
3440	4822 051 20158	1,5	Ω	0,1W	
3441	4822 116 52233	10	kΩ	0,5W	
3442	4822 050 11002	1	kΩ	0,4W	
3443	4822 051 10102	1	kΩ	0,25W	
3444	4822 051 20103	10	kΩ	0,1W	
3445	4822 051 20223	22	kΩ	0,1W	
3446	4822 051 10102	1	kΩ	0,25W	
3447	4822 116 52233	10	kΩ	0,5W	
3448	4822 051 20223	22	kΩ	0,1W	
3449	4822 051 20104	100	kΩ	0,1W	
3450	4822 051 20225	2,2	MΩ	0,1W	
3451	4822 116 52233	10	kΩ	0,5W	
3452	4822 051 20393	39	kΩ	0,1W	
3453	4822 051 20472	4,7	kΩ	0,1W	
3454	4822 051 20471	470	Ω	0,1W	
3455	4822 051 20221	220	Ω	0,1W	
3456	4822 116 52283	4,7	kΩ	0,5W	not for ECO
3457	4822 051 20472	4,7	kΩ	0,1W	
3458	4822 051 20472	4,7	kΩ	0,1W	
3459	4822 116 52233	10	kΩ	0,5W	not for ECO
3460	4822 116 52233	10	kΩ	0,5W	
3461	4822 051 20101	100	Ω	0,1W	
3462	4822 051 20101	100	Ω	0,1W	
3463	4822 051 20103	10	kΩ	0,1W	
3464	4822 051 20833	82	kΩ	0,1W	only for PAL I
3465	4822 051 20472	4,7	kΩ	0,1W	not for ECO
3466	4822 051 20222	2,2	kΩ	0,1W	not for ECO
3467	4822 051 20472	4,7	kΩ	0,1W	
3468	4822 116 52224	470	Ω	0,5W	
3469	4822 051 10102	1	kΩ	0,25W	
3470	4822 116 52224	470	Ω	0,5W	
3471	4822 051 20472	4,7	kΩ	0,1W	only for LP
3472	4822 051 10102	1	kΩ	0,1W	not for 4 head
3473	4822 116 52256	2,2	kΩ	1/6W	only for ECO
3485	4822 051 20222	2,2	kΩ	0,1W	
3486	4822 051 20182	1,8	kΩ	0,1W	
3488	4822 116 52256	2,2	kΩ	0,5W	
3489	4822 051 20103	10	kΩ	0,1W	
3498	4822 051 20101	100	Ω	0,1W	only for 4 head
3499	4822 051 20472	4,7	kΩ	0,1W	not for 4 head
3500	4822 116 52226	560	Ω	0,5W	
3501	4822 051 10102	1	kΩ	0,25W	
3502	4822 051 10102	1	kΩ	0,25W	
3504	4822 051 20471	470	Ω	0,1W	
3505	4822 051 20153	15	kΩ	0,1W	
3506	4822 116 52296	6,8	kΩ	0,5W	
3507	4822 116 52296	6,8	kΩ	0,5W	
3508	4822 051 20331	330	Ω	0,1W	
3509	4822 051 20103	10	kΩ	0,1W	
3510	4822 051 20103	10	kΩ	0,1W	
3511	4822 116 52202	82	Ω	0,5W	
3512	4822 051 20331	330	Ω	0,1W	
3513	4822 051 20103	10	kΩ	0,1W	
3514	4822 051 20104	100	kΩ	0,1W	
3515	4822 051 20759	75	Ω	0,1W	
3516	4822 116 52289	5,6	kΩ	0,5W	
3517	4822 116 52233	10	kΩ	0,5W	
3520	4822 051 20333	33	kΩ	0,1W	
3521	4822 116 52175	100	Ω	0,5W	
3600	4822 051 20479	47	Ω	0,1W	
3601	4822 051 20563	56	kΩ	0,1W	
3602	4822 051 20331	330	Ω	0,1W	only for LP
3603	4822 051 20123	12	kΩ	0,1W	
3604	4822 051 20394	390	kΩ	0,1W	
3605	4822 051 20101	100	Ω	0,1W	
3606	4822 100 11843	10	kΩ		
3607	4822 051 20105	1	MΩ	0,1W	
3608	4822 051 20473	47	kΩ	0,1W	
3609	4822 051 20104	100	kΩ	0,1W	
3610	4822 051 20123	12	kΩ	0,1W	
3611	4822 051 10333	33	kΩ	0,25W	
3612	4822 051 20183	18	kΩ	0,1W	
3613	4822 051 20912	9,1	kΩ	0,1W	
3614	4822 051 20153	15	kΩ	0,1W	
3615	4822 051 20471	470	Ω	0,1W	only for LP
3616	4822 051 10102	1	kΩ	0,25W	
3617	4822 051 20223	22	kΩ	0,1W	
3618	4822 101 11222	100	kΩ	0,1W	
3619	4822 051 20158	1,5	Ω	0,1W	
3620	4822 051 20473	47	kΩ	0,1W	
3621	4822 051 20103	10	kΩ	0,1W	
3623	4822 051 20103	10	kΩ	0,1W	
3624	4822 051 20332	3,3	kΩ	0,1W	
3625	4822 051 10339	33	Ω	0,25W	
3626	4822 051 10479	47	Ω	0,25W	
3627	4822 051 20332	3,3	kΩ	0,1W	
3628	4822 051 20103	10	kΩ	0,1W	
3700	4822 050 11003	10	kΩ	0,4W	only for VST
3701	4822 050 11303	13	kΩ	0,4W	only for VST
3702	4822 051 10101	100	Ω	1/8W	only for PLL
3703	4822 051 10101	100	Ω	1/8W	only for PLL
3705	4822 051 20223	22	kΩ	0,1W	only for VST
3706	4822 051 20683	68	kΩ	0,1W	only for VST
3707	4822 050 12202	2,2	kΩ	0,4W	only for VST
3708	4822 050 15604	560	kΩ	0,4W	only for VST
3720	4822 050 11002	1	kΩ	0,4W	
3721	4822 051 20682	6,8	kΩ	0,1W	
3722	4822 051 20223	22	kΩ	0,1W	
3724	4822 101 11218	22	kΩ		
3725	4822 116 52226	560	Ω	0,5W	
3728	4822 051 20183	18	kΩ	0,1W	
3729	4822 051 20183	18	kΩ	0,1W	
3730	4822 116 52219	330	Ω	0,5W	
3731	4822 051 20561	560	Ω	0,1W	not for PAL I
3732	4822 051 20222	2,2	kΩ	0,1W	
3733	4822 051 20222	2,2	kΩ	0,1W	
3735	4822 051 20473	47	kΩ	0,1W	not f. PAL I & PLL
3736	4822 051 20473	47	kΩ	0,1W	not f. PAL I & PLL
3739	4822 051 20223	22	kΩ	0,1W	
3740	4822 051 20471	470	Ω	for PAL BG/SEC DK & PAL I	
3741	4822 051 20392	3,9	kΩ	0,1W	only for VST
3742	4822 051 20183	18	kΩ	0,1W	only for VST
3743	4822 051 20472	4,7	kΩ	0,1W	only for VST
3744	4822 051 10102	1	kΩ	0,25W	only for VST
3745	4822 051 20472	4,7	kΩ	0,1W	only for VST
3745	4822 051 20561	560	Ω	0,1W	only for PLL
3746	4822 051 20122	1,2	kΩ	0,1W	only for VST
3747	4822 051 20122	1,2	kΩ	0,1W	only for VST
3750	4822 050 11803	18	kΩ	0,4W	
3751	4822 050 14702	4,7	kΩ	0,4W	
3752	4822 051 20471	470	Ω	0,1W	
3753	4822 051 10102	1	kΩ	0,25W	only for PLL
3754	4822 051 20331	330	Ω	0,1W	
3755	4822 051 10109	10	Ω	0,25W	
3756	4822 051 20223	22	kΩ	0,1W	
3757	4822 051 20471	470	Ω	0,1W	
3760	4822 051 20823	82	kΩ	0,1W	only for VST
3761	4822 116 52234	100	kΩ	0,5W	not for ECO
3901	4822 051 10008	0	Ω	0,25W	
3902	4822 051 10008	0	Ω		only f. PAL I & ECO
3903	4822 051 10008	0	Ω	0,25W	

⚠.....Safety component, use only this type

FAMILY BOARD N1 N2

3904	4822 051 10008	0	Ω	0,25W	
3905	4822 051 10008	0	Ω	0,25W	not for 4 head
3906	4822 051 10008	0	Ω	0,25W	
3907	4822 051 10008	0	Ω	0,25W	
3950	4822 051 10008	0	Ω	0,25W	
3953	4822 051 10008	0	Ω	0,25W	only for PLL
3954	4822 051 20008	0	Ω	0,1W	
3985	4822 051 10008	0	Ω	0,25W	

COILS

5002	4822 157 53253	27	µH	
5003	4822 157 53265	100	µH	
5004	4822 157 52842	15	µH	
5005	4822 157 53253	27	µH	
5006	4822 157 53251	8,2	µH	
5008	4822 157 53251	8,2	µH	
5009	4822 157 52842	15	µH	
5010	4822 157 53253	27	µH	
5011	4822 157 52842	15	µH	
5012	4822 157 53265	100	µH	
5013	4822 157 52842	15	µH	
5014	4822 157 53251	8,2	µH	
5015	4822 157 63676	56	µH	
5016	4822 157 53253	27	µH	
5017	4822 157 63676	56	µH	
5021	4822 157 50961	22	µH	
5022	4822 157 52285	6,8	µH	
5023	4822 157 63675			
5024	4822 157 63678	560	µH	
5025	4822 157 53253	27	µH	
5401	4822 157 52286	22	µH	
5402 ⚠	4822 157 53005	33	nH	
5501	4822 157 52285	6,8	µH	
5601	4822 157 70038	10	mH	
5602	4822 158 10525	330	µH	
5603	4822 157 53531			
5604	4822 157 62681			
5701	4822 157 63717	6,8 µH		
5703	4822 157 70017			
5720	4822 157 62681	1,2 µH		
5721	4822 157 52285	6,8 µH		
5722	4822 157 52842	15 µH		

DIODES

6001	4822 130 30621	1N4148	
6002	4822 130 30621	1N4148	
6004	4822 130 31983	BAT85	
6401	4822 130 30621	1N4148	
6402	4822 130 30621	1N4148	not for ECO
6501	4822 130 34197	BZX79-B12	
6502	4822 130 34197	BZX79-B12	
6504	4822 130 31024	BZX79-B18	
6506	4822 130 34197	BZX79-B12	
6507	4822 130 34197	BZX79-B12	
6508	4822 130 34278	BZX79-B6V8	
6509	4822 130 30621	1N4148	
6510	4822 130 30621	1N4148	
6702	4822 130 30621	1N4148	

TRANSISTORS & IC's

7000	5322 130 41983	BC858B	
7001	5322 130 41982	BC848B	only for PAL BG/SEC DK
7006	5322 130 41983	BC858B	
7007	5322 130 41982	BC848B	
7016	5322 130 41982	BC848B	
7017	4822 130 42353	BSF19-F2	
7018	4822 130 60383	BF824	
7019	4822 130 42353	BSF19-F2	
7020	4822 130 60145	DTC124E/25	only for LP
7025	5322 130 41982	BC848B	
7026	5322 130 41982	BC848B	
7029	4822 130 42353	BSF19-F2	
7030	5322 130 41982	BC848B	
7031	5322 130 41982	BC848B	
7032	5322 130 41982	BC848B	
7036	5322 130 41982	BC848B	
7037	4822 130 61495	DTA124EK	not for 4 head
7038	4822 130 61495	DTA124EK	not for 4 head
7051	4822 209 32155	LA7191	
7053	4822 209 60177	LM339D	
7301	4822 209 32728	SDA5642	only for VPS
7402	4822 209 30146	L2722	
7403	5322 130 41982	BC848B	
7404	5322 130 41982	BC848B	
7405	4822 130 60145	DTC124E/25	
7406	4822 130 60145	DTC124E/25	not for ECO
7407	5322 130 41982	BC848B	
7408	4822 130 60089	BD436	
7410	4822 209 32736	TMP91C642N-MMTD4-4U	
7410	4822 209 33493	TMP91C642N-NTDQ1-1U	only ECO
7411	4822 209 30836	SAA1310/N2	
7412	4822 209 62098	ST24C02CP	only for VST
7412	4822 209 62098	ST24C02CP	only for ECO
7412	4822 209 32709	ST24C04CB1	only for PLL
7413	4822 130 61495	DTA124EK	
7500	5322 130 41983	BC858B	
7501	5322 130 41983	BC858B	
7502	5322 130 41982	BC848B	
7504	4822 209 30692	MSM7403RS	
7505	5322 130 41983	BC858B	only for PAL BG/SEC DK
7506	5322 130 41983	BC858B	
7551	5322 209 10576	HEF4053BD	
7601	4822 209 31548	LA7282	
7602	5322 130 41982	BC848B	
7603	4822 130 41344	BC337-40	
7604	4822 130 41715	BC328-40	
7605	4822 130 60145	DTC124E/25	
7606	5322 130 41982	BC848B	
7607	4822 130 41715	BC328-40	
7700	4822 209 60175	LM358D	only for VST
7701	5322 209 10421	HEF4094BD	only for VST
7702	4822 209 31532	TDA9800/V3	
7703	4822 209 81397	TL431CLPST	
7704	4822 209 10273	HEF4104BD	only for VST
7705	5322 130 41983	BC858B	
7706	4822 130 60089	BD436	
7707	5322 130 41982	BC848B	
7708	5322 130 41982	BC848B	not for PAL I & PLL
7709	5322 130 41982	BC848B	not for PAL I & PLL
7710	4822 130 61495	DTA124EK	not for PAL I & PLL
7711	5322 130 41983	BC858B	not for PAL I & PLL
7713	5322 130 60508	BC857B	only for VST
7714	4822 130 60511	BC847B	only for VST

⚠.....Safety component, use only this type

CONNECTORS

4822 267 51163	10 pin
4822 267 51281	15 pin
4822 267 51164	16 pin
4822 267 51281	15 pin
4822 267 41062	6 pin
4822 265 30989	3 pin
4822 265 30987	7 pin
4822 267 40696	3 pin
4822 267 31513	SCART

MISCELLANEOUS

1400	⚠ 4822 071 56301	Fuse 630mA	
1401	4822 242 73809	Crystal 10 MHz	
1402	⚠ 4822 071 58009	Fuse 80mA	
1500	4822 214 33713	MDLK6D906A	only for PAL BG
1500	4822 214 33718	MDLK6B776A	only for PAL I
1500	4822 214 33417	Boster	only for SECAM L & Multistd.
1501	4822 157 60192	Group Delay	not for PAL I
1601	4822 242 81067	Crystal 4.433 619 MHZ	
1602	⚠ 4822 071 58001	Fuse 800mA	
1603	4822 320 40168	Delay line	not for SECAM L
1701	4822 210 10392	UV916E	
1701	4822 210 10393	UV944C	only for PAL I
1720	4822 242 81261	OFWG1966M	only for PAL BG
1720	4822 242 81436	OFWK3953M	only for SECAM L
1720	4822 242 70936	OFWJ1952	only for PAL I
1721	4822 242 81259	OFWK6256	only for Multistandard
1740	4822 242 72586	TPS5,5MB-TF20	only for PAL BG
1745	4822 242 72914	SFSH5,5MDB	only for PAL BG
1745	4822 242 72577	SFE6,0MB	only for PAL I
1821	4822 242 81423	OFWL9453M	only for Multistandard

CAPACITORS

2000	5322 122 32659	33	pF	50V	
2001	4822 122 33514	68	pF	50V	
2002	4822 126 10326	180	pF	63V	
2003	4822 122 33575	220	pF	50V	
2004	5322 122 32965	18	pF	50V	
2009	4822 124 80454	10	µF	16V	
2010	5322 122 34123	1	nF	50V	
2011	4822 124 40248	10	µF	63V	
2012	4822 124 80705	1	µF	50V	
2013	4822 122 31771	390	pF	63V	
2014	5322 122 32452	47	pF	63V	
2015	4822 122 33177	10	nF	50V	
2018	5322 122 32531	100	pF	50V	
2019	5322 122 33538	150	pF	63V	
2020	5322 122 32531	100	pF	50V	
2021	4822 124 41584	100	µF	10V	
2022	5322 122 31946	27	pF	50V	
2023	4822 124 40196	220	µF	16V	
2024	4822 124 40433	47	µF	25V	
2025	5322 122 32654	22	nF	63V	
2026	5322 122 32531	100	pF	50V	
2027	4822 122 33515	82	pF	63V	not for SECAM L
2028	5322 122 33861	120	pF	50V	
2029	5322 122 32452	47	pF	63V	
2030	4822 122 31947	100	nF	63V	
2032	4822 124 23053	1	µF	50V	
2033	5322 122 33861	120	pF	50V	not for SECAM L
2034	5322 122 32654	22	nF	63V	
2035	4822 124 40242	1	µF	63V	
2038	4822 122 33514	68	pF	50V	
2039	5322 122 33538	150	pF	63V	
2040	4822 124 22826	10	µF	16V	
2041	4822 124 22826	10	µF	16V	
2042	4822 126 10002	100	nF	25V	
2043	4822 122 31797	22	nF	63V	
2045	4822 122 33177	10	nF	50V	not for SECAM L
2046	4822 124 23053	1	µF	50V	
2047	4822 124 23053	1	µF	50V	
2048	4822 122 32542	47	nF	63V	
2050	5322 122 31946	27	pF	50V	
2052	4822 124 40248	10	µF	63V	
2055	4822 122 31947	100	nF	63V	
2056	4822 122 33797	47	nF	50V	not for SECAM L
2057	4822 122 33797	47	nF	50V	
2058	4822 124 80227	2,2	µF	35V	
2059	4822 124 40242	1	µF	63V	
2060	4822 122 32442	10	nF		only for TXT
2061	5322 122 34123	1	nF	50V	not for SECAM L
2063	5322 122 34123	1	nF	50V	not for SECAM L
2064	4822 122 31947	100	nF	63V	
2065	4822 122 33514	68	pF	50V	
2066	5322 122 31946	27	pF	50V	
2067	5322 122 32659	33	pF	50V	
2068	4822 122 33514	68	pF	50V	
2069	5322 122 31946	27	pF	50V	
2070	4822 122 33515	82	pF	63V	
2070	4822 122 33514	68	pF		only for LP
2070	4822 126 10004	120	pF		only for SECAM L
2071	5322 122 32452	47	pF	63V	
2072	5322 122 34123	1	nF	50V	
2079	4822 122 33177	10	nF	50V	not for SECAM L
2080	5322 122 34123	1	nF	50V	not for SECAM L
2087	5322 116 80853	560	pF	63V	
2087	4822 122 33575	270	pF		only for SECAM L
2088	4822 122 31947	100	nF	63V	
2090	4822 122 31947	100	nF	63V	
2095	4822 122 31772	47	pF	63V	
2096	5322 122 32452	47	pF	63V	
2099	5322 122 31946	27	pF	50V	not for SECAM L
2101	5322 122 33861	120	pF	50V	not for SECAM L
2106	5322 122 32481	15	pF	50V	not for SECAM L
2107	4822 122 33177	10	nF	50V	not for 4 head
2211	5322 122 32452	47	pF		only for 4 head
2402	4822 124 40433	47	µF	25V	
2403	5322 122 32654	22	nF	63V	
2404	5322 126 10223	4,7	nF	63V	
2405	5322 122 32658	22	pF	50V	
2406	5322 122 32658	22	pF	50V	
2407	4822 122 31947	100	nF	63V	
2408	4822 122 31947	100	nF	63V	
2409	4822 122 33177	10	nF	50V	
2410	4822 124 40433	47	µF	25V	
2411	5322 126 10223	4,7	nF	63V	
2412	4822 124 40433	47	µF	25V	
2413	5322 122 34123	1	nF	50V	
2414	4822 122 33811	33	nF	50V	
2415	4822 126 10002	100	nF	25V	
2416	4822 126 10002	100	nF	25V	
2417	4822 124 40433	47	µF	25V	
2418	4822 122 33177	10	nF	50V	
2419	5322 126 10223	4,7	nF	63V	
2420	4822 124 40433	47	µF	25V	
2423	4822 122 31947	100	nF	63V	
2424	5322 122 32654	22	nF	63V	
2506	4822 126 10002	100	nF	25V	
2507	4822 124 22826	10	µF	16V	
2530	5322 122 32268	470	pF	50V	
2531	5322 122 32268	470	pF	50V	
2540	5322 122 32268	470	pF	50V	
2592	4822 122 33177	10	nF	50V	
2600	5322 122 34123	1	nF	50V	
2601	5322 122 31865	1,5	nF		only for 4 head
2602	4822 122 31947	100	nF		only for 4 head
2604	4822 122 33177	10	nF	50V	
2605	4822 124 40433	47	µF	25V	
2606	4822 122 31947	100	nF	63V	
2607	4822 122 31947	100	nF	63V	
2608	5322 122 32268	470	pF	50V	
2609	4822 124 40433	47	µF	25V	
2610	4822 122 33175	2,2	nF	50V	
2611	4822 124 40433	47	µF	25V	
2612	5322 122 32654	22	nF		only for 4 head
2613	4822 122 32442	10	nF	50V	
2614	4822 124 40242	1	µF	63V	
2615	4822 124 40433	47	µF	25V	

⚠.....Safety component, use only this type

2616	4822 124 40433	47	µF	25V	
2617	4822 124 40433	47	µF	25V	
2618	5322 122 31863	330	pF	50V	
2619	4822 124 40433	47	µF	25V	
2620	4822 121 43526	47	nF	250V	
2621	5322 122 34123	1	nF	50V	
2622	5322 121 42489	33	nF	250V	
2623	4822 122 32442	10	nF	50V	
2624	4822 124 40242	1	µF	63V	
2701	4822 122 31947	100	nF	63V	
2702	4822 122 33177	10	nF	50V	
2703	5322 124 41431	22	µF	35V	
2704	4822 124 40242	1	µF	63V	
2720	5322 122 32531	100	pF	50V	
2725	4822 122 31947	100	nF	63V	
2726	5322 122 32654	22	nF	63V	not for SECAM L
2727	4822 124 80227	2,2	µF	35V	not for SECAM L
2728	4822 124 40248	10	µF	63V	not for SECAM L
2737	4822 122 31947	100	nF	63V	
2738	5322 124 41431	22	µF	35V	
2739	4822 122 31947	100	nF	63V	
2740	4822 124 41576	2,2	µF	50V	
2741	4822 122 31947	100	nF	63V	
2790	4822 124 80228	4,7	µF	25V	
2791	4822 124 80231	47	µF	16V	
2833	4822 122 31765	100	pF		only for SECAM L & Multist.
2843	4822 124 22826	10	µF	16V	

RESISTORS

3001	4822 116 52224	470	Ω	0,5W	
3007	4822 051 20101	100	Ω	0,1W	
3002	4822 051 20222	2,2	kΩ	0,1W	only for TXT
3003	4822 051 20472	4,7	kΩ		only for TXT
3004	4822 051 20104	100	kΩ	0,25W	only for TXT
3005	4822 117 10834	47	kΩ		only for TXT
3006	4822 051 20472	4,7	kΩ		only for TXT
3008	4822 051 20223	22	kΩ	0,1W	
3009	4822 051 20222	2,2	kΩ	0,1W	not for SECAM L
3010	4822 100 12156	4,7	kΩ		
3011	4822 117 10833	10	kΩ	0,1W	
3014	4822 051 10104	100	kΩ	0,25W	
3017	4822 117 10833	10	kΩ	0,1W	
3018	4822 100 12156	4,7	kΩ		
3019	4822 051 10682	6,8	kΩ	0,25W	
3020	4822 100 12156	4,7	kΩ		
3021	4822 051 20272	2,7	kΩ	0,1W	
3022	4822 051 20821	820	Ω	0,1W	
3023	4822 051 10102	1	kΩ	0,25W	
3025	4822 051 20104	100	kΩ	0,1W	
3026	4822 051 20472	4,7	kΩ	0,1W	
3027	4822 051 20681	680	Ω	0,1W	
3028	4822 051 20472	4,7	kΩ	0,1W	
3029	4822 051 20472	4,7	kΩ	0,1W	
3030	4822 051 20222	2,2	kΩ	0,1W	
3031	4822 051 20333	33	kΩ	0,1W	
3033	4822 051 10102	1	kΩ	0,25W	
3034	4822 051 20222	2,2	kΩ	0,1W	
3036	4822 051 20392	3,9	kΩ	0,1W	
3037	4822 051 20122	1,2	kΩ	0,1W	
3038	4822 051 20392	3,9	kΩ	0,1W	
3039	4822 100 12157	10	kΩ		
3040	4822 051 20222	2,2	kΩ	0,1W	
3041	4822 051 20472	4,7	kΩ	0,1W	
3043	4822 051 20561	560	Ω	0,1W	
3044	4822 051 10102	1	kΩ	0,25W	
3045	4822 051 20472	4,7	kΩ	0,1W	
3046	4822 051 20222	2,2	kΩ	0,1W	
3051	4822 051 20105	1	MΩ	0,1W	
3052	4822 051 20822	8,2	kΩ	0,1W	
3054	4822 051 20562	5,6	kΩ	0,1W	
3055	4822 051 20821	820	Ω	0,1W	
3061	4822 051 20008	0	Ω	0,1W	not for SECAM L
3062	4822 051 20182	1,8	kΩ	0,1W	not for SECAM L
3063	4822 051 20271	270	Ω	0,1W	not for SECAM L
3064	4822 051 20561	560	Ω	0,1W	not for SECAM L
3065	4822 051 10102	1	kΩ	0,25W	
3066	4822 051 20122	1,2	kΩ	0,1W	
3067	4822 051 20391	390	Ω	0,1W	
3068	4822 051 10102	1	kΩ	0,25W	
3069	4822 051 20561	560	Ω	0,1W	
3070	4822 051 20391	390	Ω	0,1W	
3071	4822 051 20681	680	Ω	0,1W	
3072	4822 051 20271	270	Ω	0,1W	
3073	4822 051 10102	1	kΩ	0,25W	
3075	4822 051 20471	470	Ω	0,1W	
3076	4822 051 20331	330	Ω	0,1W	
3077	4822 051 20183	18	kΩ	0,1W	
3078	4822 051 20183	18	kΩ	0,1W	
3089	4822 051 10102	1	kΩ	0,25W	not for SECAM L
3090	4822 051 10102	1	kΩ	0,25W	not for SECAM L
3091	4822 051 20562	5,6	kΩ	0,1W	not for SECAM L
3092	4822 051 20332	3,3	kΩ	0,1W	not for SECAM L
3093	4822 051 20152	1,5	kΩ	0,1W	not for SECAM L
3094	4822 051 20222	2,2	kΩ	0,1W	not for SECAM L
3095	4822 116 52283	4,7	kΩ	0,5W	only for SECAM
3096	4822 100 12157	10	kΩ		not for SECAM L
3097	4822 051 20332	3,3	kΩ	0,1W	
3099	4822 100 12155	2,2	kΩ		
3100	4822 051 10102	1	kΩ	0,25W	
3104	4822 051 20472	4,7	kΩ	0,1W	
3105	4822 051 20122	1,2	kΩ	0,1W	
3106	4822 051 20271	270	Ω	0,1W	
3109	4822 051 20561	560	Ω	0,1W	
3111	4822 051 20471	470	Ω	0,1W	
3112	4822 051 20222	2,2	kΩ	0,1W	
3116	4822 116 52233	10	kΩ	0,5W	
3117	4822 051 20183	18	kΩ	0,1W	
3119	4822 116 52175	100	Ω	0,5W	
3128	4822 051 20223	22	kΩ	0,1W	not for SECAM L
3132	4822 051 20681	680	Ω	0,1W	not for SECAM L
3135	4822 051 20104	100	kΩ	0,1W	
3137	4822 051 10102	1	kΩ	0,25W	
3218	4822 051 20103	10	kΩ	0,1W	only for 4 head
3407	4822 051 20222	2,2	kΩ	0,1W	
3410	4822 116 52199	68	Ω	0,5W	
3411	4822 116 52199	68	Ω	0,5W	
3412	4822 051 20472	4,7	kΩ	0,1W	
3413	4822 116 52283	4,7	kΩ	0,5W	
3414	4822 051 20472	4,7	kΩ	0,1W	
3415	4822 050 11002	1	kΩ	0,4W	
3416	4822 116 52234	100	kΩ	0,5W	
3417	4822 116 52283	4,7	kΩ	0,5W	
3418	4822 051 20333	33	kΩ	0,1W	
3419	4822 051 10102	1	kΩ	0,25W	
3420	4822 116 52224	470	Ω	0,5W	
3421	4822 051 10101	100	Ω	0,25W	not for LP
3422	4822 051 20182	1,8	kΩ	0,1W	
3423	4822 051 20182	1,8	kΩ	0,1W	
3424	4822 117 10833	10	kΩ	0,1W	
3425	4822 117 10833	10	kΩ	0,1W	
3426	4822 051 20682	6,8	kΩ	0,1W	
3427	4822 051 20122	1,2	kΩ	0,1W	
3428	4822 116 52283	4,7	kΩ	0,5W	
3429	4822 116 52283	4,7	kΩ	0,5W	
3430	4822 116 52224	470	Ω	0,5W	
3431	4822 050 11002	1	kΩ	0,4W	
3432	4822 050 11002	1	kΩ	0,4W	
3433	4822 117 10833	10	kΩ	0,1W	
3434	4822 051 10223	22	kΩ	0,25W	
3435	4822 051 20823	82	kΩ	0,1W	
3436	4822 051 20223	22	kΩ	0,1W	
3437	4822 117 10833	10	kΩ	0,1W	
3438	4822 051 20392	3,9	kΩ	0,1W	
3439	4822 051 20223	22	kΩ	0,1W	
3440	4822 051 10158	1,5	Ω	0,25W	
3441	4822 116 52233	10	kΩ	0,5W	
3442	4822 050 11002	1	kΩ	0,4W	
3443	4822 051 10102	1	kΩ	0,25W	
3444	4822 051 10103	10	kΩ	0,25W	
3445	4822 051 10223	22	kΩ	0,25W	
3446	4822 051 10102	1	kΩ	0,25W	
3447	4822 116 52233	10	kΩ	0,5W	

⚠.....Safety component, use only this type

3448	4822 051 20223	22	kΩ	0,1W	not for ECO
3449	4822 051 20104	100	kΩ	0,1W	
3450	4822 051 20225	2,2	MΩ	0,1W	
3451	4822 116 52233	10	kΩ	0,5W	
3452	4822 051 20393	39	kΩ	0,1W	
3453	4822 051 20472	4,7	kΩ	0,1W	
3454	4822 051 20471	470	Ω	0,1W	
3455	4822 051 20221	220	Ω	0,1W	
3456	4822 051 20472	4,7	kΩ	0,1W	not for ECO
3457	4822 051 20472	4,7	kΩ	0,1W	
3458	4822 051 20472	4,7	kΩ	0,1W	
3459	4822 116 52233	10	kΩ	0,5W	not for ECO
3460	4822 050 11002	1	kΩ	0,4W	
3461	4822 116 52175	100	Ω	0,5W	
3462	4822 116 52175	100	Ω	0,5W	
3463	4822 116 52175	100	Ω	0,5W	only for 4 head
3464	4822 117 10833	10	kΩ	0,1W	
3465	4822 051 10102	1	kΩ	0,25W	
3466	4822 116 52224	470	Ω	0,5W	
3467	4822 051 20472	4,7	kΩ	0,1W	
3468	4822 116 52224	470	Ω	0,5W	
3471	4822 051 10472	4,7	kΩ	0,25W	not for ECO
3472	4822 051 20182	1,8	kΩ	0,1W	
3473	4822 051 20472	4,7	kΩ	0,1W	
3474	4822 051 20472	4,7	kΩ	0,1W	
3475	4822 116 52256	2,2	kΩ	0,5W	not for ECO
3476	4822 117 10833	10	kΩ	0,1W	
3477	4822 116 52303	8,2	kΩ	0,5W	
3478	4822 116 52233	10	kΩ	0,5W	
3479	4822 051 20158	1,5	Ω	0,1W	
3480	4822 051 20158	1,5	Ω	0,1W	
3481	4822 051 10102	1	kΩ	0,25W	not for 4 head
3482	4822 117 10833	10	kΩ	0,1W	
3483	4822 116 52283	4,7	kΩ	0,5W	
3484	4822 051 20472	4,7	kΩ	0,1W	not for 4 head
3485	4822 051 20222	2,2	kΩ	0,1W	
3486	4822 051 20182	1,8	kΩ	0,1W	
3487	4822 051 20472	4,7	kΩ	0,1W	
3489	4822 050 11002	1	kΩ	0,4W	
3490	4822 051 20222	2,2	kΩ	0,1W	
3491	4822 116 52233	10	kΩ	0,5W	
3492	4822 051 10102	1	kΩ	0,25W	
3500	4822 051 10102	1	kΩ	0,25W	
3501	4822 051 10102	1	kΩ	0,25W	
3502	4822 050 11002	1	kΩ	0,4W	
3503	4822 116 52219	330	Ω	0,5W	
3504	4822 117 10833	10	kΩ	0,1W	
3505	4822 116 52233	10	kΩ	0,5W	
3506	4822 051 10473	47	kΩ	0,25W	
3512	4822 051 20332	3,3	kΩ	0,1W	
3513	4822 051 20332	3,3	kΩ	0,1W	
3516	4822 051 20472	4,7	kΩ	0,1W	
3517	4822 051 10102	1	kΩ	0,25W	
3519	4822 051 10152	1,5	kΩ	0,25W	
3520	4822 051 20829	82	Ω	0,1W	
3530	4822 051 20682	6,8	kΩ	0,1W	
3531	4822 051 20682	6,8	kΩ	0,1W	
3532	4822 051 20224	220	kΩ	0,1W	
3540	4822 051 20471	470	Ω	0,1W	
3596	4822 116 52283	4,7	kΩ	0,5W	
3600	4822 051 20479	47	Ω	0,1W	
3601	4822 051 20104	100	kΩ	0,1W	
3602	4822 051 20331	330	Ω	0,1W	only for 4 head
3603	4822 051 20123	12	kΩ	0,1W	
3604	4822 051 20394	390	kΩ	0,1W	
3605	4822 051 20101	100	Ω	0,1W	
3606	4822 100 12157	10	kΩ		
3607	4822 051 20105	1	MΩ	0,1W	
3608	4822 117 10834	47	kΩ	0,1W	
3609	4822 051 20104	100	kΩ	0,1W	
3610	4822 117 10833	10	kΩ	0,1W	
3611	4822 051 20333	33	kΩ	0,1W	
3612	4822 051 10153	15	kΩ	0,25W	
3613	4822 051 20472	4,7	kΩ	0,1W	
3614	4822 051 20123	12	kΩ	0,1W	
3615	4822 051 20471	470	Ω		only for 4 head
3616	4822 051 20561	560	Ω	0,1W	
3617	4822 051 20223	22	kΩ	0,1W	
3618	4822 100 12159	100	kΩ		
3619	4822 051 10158	1,5	Ω	0,25W	
3620	4822 117 10834	47	kΩ	0,1W	
3621	4822 051 20223	22	kΩ	0,1W	
3622	4822 117 10834	47	kΩ	0,1W	
3623	4822 117 10833	10	kΩ	0,1W	
3624	4822 051 20332	3,3	kΩ	0,1W	
3625	4822 051 10339	33	Ω	0,25W	
3626	4822 051 20479	47	Ω	0,1W	
3627	4822 051 20332	3,3	kΩ	0,1W	
3628	4822 117 10833	10	kΩ	0,1W	
3629	4822 051 20224	220	kΩ	0,1W	
3702	4822 116 52175	100	Ω	0,5W	
3703	4822 116 52175	100	Ω	0,5W	
3704	4822 051 10008	0	Ω	0,25W	
3705	4822 116 52257	22	kΩ	0,5W	
3707	4822 051 20103	10	kΩ	0,1W	not for PAL BG
3708	4822 117 10833	10	kΩ	0,1W	
3723	4822 051 20154	150	kΩ	0,1W	not for SECAM L
3725	4822 051 20682	6,8	kΩ	0,1W	
3726	4822 051 20223	22	kΩ	0,1W	not for SECAM L
3727	4822 051 20152	1,5	kΩ	0,1W	
3728	4822 051 20823	82	kΩ	0,1W	not for SECAM L
3729	4822 051 20332	3,3	kΩ	0,1W	not for SECAM L
3730	4822 051 20183	18	kΩ	0,1W	
3731	4822 051 20183	18	kΩ	0,1W	
3737	4822 116 52256	2,2	kΩ	0,5W	not for SECAM L
3739	4822 117 10834	47	kΩ	0,1W	not for SECAM L
3742	4822 100 12158	22	kΩ		
3743	4822 051 20271	270	Ω	0,1W	
3745	4822 051 20561	560	Ω	0,1W	not for SECAM L
3749	4822 051 20561	560	Ω	0,1W	
3756	4822 051 20223	22	kΩ	0,1W	
3760	4822 051 20222	2,2	kΩ	0,1W	not for TXT
3761	4822 100 12156	4,7	kΩ	Trim	only for TXT
3762	4822 051 20222	2,2	kΩ	0,1W	
3782	4822 051 20222	2,2	kΩ	0,1W	not for SECAM L
3790	4822 116 52176	10	Ω	0,5W	
3791	4822 051 20331	330	Ω	0,1W	
3792	4822 116 52176	10	Ω	0,5W	
3795	4822 051 10102	1	kΩ	0,25W	
3796	4822 051 20101	100	Ω	0,1W	
3797	4822 051 20681	680	Ω	0,1W	
3798	4822 051 20101	100	Ω	0,1W	
3799	4822 051 20391	390	Ω	0,1W	
3854	4822 051 10008	0	Ω	0,25W	
3857	4822 051 10008	0	Ω	0,25W	
3858	4822 051 10008	0	Ω	0,25W	
3859	4822 051 10102	1	kΩ	0,25W	
3900	4822 051 10102	1	kΩ	0,25W	
3901	4822 051 20008	0	Ω	0,1W	only for SECAM L
3903	4822 051 20008	0	Ω	0,1W	
3906	4822 051 10008	0	Ω	0,25W	not for 4 head
3907	4822 051 10008	0	Ω	0,25W	only for TXT
3908	4822 051 20008	0	Ω	0,1W	only for TXT
3910	4822 051 20008	0	Ω	0,1W	only for 4 head
3912	4822 051 10008	0	Ω	0,25W	
3913	4822 051 10008	0	Ω	0,25W	
3914	4822 051 10008	0	Ω	0,25W	
3916	4822 051 10008	0	Ω	0,25W	
3917	4822 051 10008	0	Ω	0,25W	
3921	4822 051 10008	0	Ω	0,25W	
3922	4822 051 20008	0	Ω	0,1W	
3925	4822 051 10008	0	Ω	0,25W	not for TXT
3926	4822 051 10008	0	Ω	0,25W	
3927	4822 051 20008	0	Ω	0,1W	
3928	4822 051 20008	0	Ω	0,1W	not for TXT
3930	4822 051 20008	0	Ω	0,1W	
3931	4822 051 10008	0	Ω	0,25W	
3933	4822 051 20008	0	Ω	0,1W	
3940	4822 051 20008	0	Ω	0,1W	only for PAL
3945	4822 051 20008	0	Ω	0,1W	
3970	4822 051 10008	0	Ω	0,25W	
3971	4822 051 10008	0	Ω	0,25W	

⚠.....Safety component, use only this type

COILS

5002	4822 157 53253	27	µH	
5003	4822 157 53265	100	µH	
5004	4822 157 52842	15	µH	
5005	4822 157 53253	27	µH	not for SECAM L
5006	4822 157 53251	8,2	µH	
5008	4822 157 53251	8,2	µH	
5009	4822 157 52842	15	µH	
5010	4822 157 53253	27	µH	
5011	4822 157 52842	15	µH	
5012	4822 157 53265	100	µH	
5013	4822 157 52842	15	µH	
5014	4822 157 53251	8,2	µH	
5015	4822 157 63676	56	µH	
5016	4822 157 53253	27	µH	
5017	4822 157 63676	56	µH	
5021	4822 157 50961	22	µH	
5022	4822 157 52285	6,8	µH	
5023	4822 157 63675	330	µH	not for SECAM L
5024	4822 157 63678	560	µH	not for SECAM L
5025	4822 157 53253	27	µH	
5401	4822 157 52286	22	µH	
5402 ⚠	4822 157 53005			
5501	4822 157 52285	6,8	µH	
5601	4822 157 70038			
5602	4822 158 10525	LAL 04T 331K		
5603	4822 157 53531			
5604	4822 157 62681			
5700	4822 157 70402	33	µH	
5701	4822 157 52285	6,8	µH	
5720	4822 157 62681			
5725	4822 157 70017			
5727	4822 157 63717	6,8	µH	
5740	4822 157 63343			

DIODES

6001	4822 130 30621	1N4148
6002	4822 130 30621	1N4148
6004	4822 130 31983	BAT85
6005	4822 130 30621	1N4148
6006	4822 130 30621	1N4148
6401	4822 130 30621	1N4148
6402	4822 130 30621	1N4148
6503	4822 130 30621	1N4148
6504	4822 130 31024	BZX79-B18
6508	4822 130 34278	BZX79-B6V8
6520	4822 130 34197	BZX79-B12
6522	4822 130 34197	BZX79-B12
6530	4822 130 34197	BZX79-B12
6531	4822 130 34197	BZX79-B12
6540	4822 130 34197	BZX79-B12
6703	5322 130 32076	BAT18
6790	4822 130 34278	BZX79-B6V8
6791	4822 130 34233	BZX79-B5V1

TRANSISTORS & IC's

7000	5322 130 41983	BC858B	
7001	5322 130 41982	BC848B	only for TXT
7002	5322 130 41982	BC848B	only for TXT
7006	5322 130 41983	BC858B	
7007	5322 130 41982	BC848B	
7008	4822 130 61495	DTA124EK	only for 4 head
7010	5322 130 41983	BC858B	
7014	5322 130 41982	BC848B	
7015	4822 130 61495	DTA124EK	not for SECAM L
7016	5322 130 41982	BC848B	not for SECAM L
7017	4822 130 42353	BSF19-F2	
7018	4822 130 60383	BF824	
7019	4822 130 42353	BSF19-F2	
7020	4822 130 61495	DTA124EK	only for 4 head
7025	5322 130 41982	BC848B	not for SECAM L
7026	5322 130 41982	BC848B	not for SECAM L
7029	4822 130 42353	BSF19-F2	
7030	5322 130 41982	BC848B	
7031	5322 130 41982	BC848B	
7032	5322 130 41982	BC848B	
7036	5322 130 41982	BC848B	
7037	4822 130 61495	DTA124EK	not for 4 head
7038	4822 130 61495	DTA124EK	not for 4 head
7051	4822 209 32155	LA7191	
7053	4822 209 60177	LM339D	only for Multistandard
7402	4822 209 30146	L2722	
7403	5322 130 41982	BC848B	
7404	5322 130 41982	BC848B	
7406	4822 130 60089	BD436	
7407	5322 130 41982	BC848B	
7408	4822 130 60729	DTC124EEKT-96	not for ECO
7409	4822 130 60729	DTC124EEKT-96	not for ECO
7410	4822 209 32736	TMP91C642N-MMTD4-4U	
7411	4822 209 30836	SAA1310/N2	
7412	4822 209 32283	ST24C08CB1	only for TXT
7412	4822 209 32709	ST24C04CB1	
7413	4822 130 61495	DTA124EK	
7500	5322 130 41983	BC858B	
7501	5322 130 41983	BC858B	
7504	4822 209 30692	MSM7403RS	
7506	5322 130 41982	BC848B	
7592	5322 209 14481	HEF4053BT	
7601	4822 209 31548	LA7282	
7602	5322 130 41982	BC848B	
7603	4822 130 41344	BC337-40	
7604	4822 130 41715	BC328-40	
7605	5322 130 41982	BC848B	
7606	5322 130 41982	BC848B	
7607	4822 130 41715	BC328-40	
7720	4822 209 31532	TDA9800/V3	
7721	5322 130 41982	BC848B	not for SECAM L
7723	5322 130 41983	BC858B	not for SECAM L
7761	5322 130 41983	BC858B	
7790	4822 130 44283	BC636	
7791	5322 130 41982	BC848B	
7792	5322 130 41982	BC848B	
7793	4822 130 44283	BC636	

⚠.....Safety component, use only this type

CONNECTORS

4822 267 51281	15 pin
4822 267 51164	16 pin
4822 267 41062	6 pin
4822 267 41162	3 pin
4822 265 30987	7 pin
4822 267 40696	3 pin
4822 267 41161	4 pin
4822 267 41163	5 pin
4822 267 31513	SCART

MISCELLANEOUS

1002	4822 071 58001	Fuse 800mA
1400	4822 071 56301	Fuse 630mA
1401	4822 242 73809	Crystal 10 MHz
1402	4822 071 58009	Fuse 80mA
1500	4822 214 33417	Booster only for SECAM
1500	4822 214 33713	MOD MDLK6D906A only for PAL
1601	4822 242 81067	Crystal 4.433 619 MHz
1603	4822 320 40168	Delay line
1701	4822 210 10392	UV916E
1720	4822 242 81261	OFWG1966M only for PAL
1721	4822 242 81259	OFWK6256K only for SECAM
1740	4822 242 72586	TPS5,5MB-TF20
1741	4822 242 81572	TPS6,0MB only for SECAM
1745	4822 242 72914	SFSH5,5MDB-TF21
1746	4822 242 81265	SFSH6,0MDB-TF21 only for SECAM
1821	4822 242 81423	B39389-L9453-M100 only f. SECAM

CAPACITORS

2000	5322 122 32659	33	pF	50V
2001	4822 122 33514	68	pF	50V
2002	4822 126 10326	180	pF	63V
2003	4822 122 33575	220	pF	50V
2004	5322 122 32965	18	pF	50V
2009	4822 124 80535	10	µF	16V
2010	5322 122 34123	1	nF	50V
2011	4822 124 22826	10	µF	16V
2012	4822 124 80705	1	µF	50V
2013	4822 126 13222	390	pF	63V
2014	5322 122 32452	47	pF	63V
2015	4822 122 33177	10	nF	50V
2017	5322 122 31946	27	pF	50V
2018	5322 122 32531	100	pF	50V
2019	4822 126 12655	150	pF	63V
2020	4822 126 13221	100	pF	63V
2021	4822 124 80879	100	µF	16V
2023	4822 124 40196	220	µF	16V
2025	5322 122 32654	22	nF	63V
2027	4822 122 33515	82	pF	63V
2028	5322 122 33861	120	pF	50V
2029	5322 122 32452	47	pF	63V
2032	4822 124 23053	1	µF	50V
2033	5322 122 33861	120	pF	50V
2034	5322 122 32654	22	nF	63V
2035	4822 124 23053	1	µF	50V
2038	4822 122 33514	68	pF	50V
2039	5322 122 33538	150	pF	63V
2040	4822 124 41402	10	µF	50V
2041	4822 124 40248	10	µF	63V
2042	4822 126 10002	100	nF	25V
2043	5322 122 32654	22	nF	63V
2045	4822 122 33177	10	nF	50V
2046	4822 124 23053	1	µF	50V
2047	4822 124 23053	1	µF	50V
2048	4822 122 33797	47	nF	50V
2050	5322 122 31946	27	pF	50V
2052	4822 124 40248	10	µF	63V
2055	4822 126 13219	100	nF	25V
2056	4822 122 33797	47	nF	50V
2057	4822 122 33797	47	nF	50V
2058	4822 124 80227	2,2	µF	35V
2059	4822 124 23053	1	µF	50V
2061	5322 122 34123	1	nF	50V
2063	5322 122 34123	1	nF	50V
2073	5322 122 34123	1	nF	50V
2076	4822 122 32442	10	nF	50V
2079	4822 122 33177	10	nF	50V
2080	5322 122 34123	1	nF	50V
2081	5322 122 34123	1	nF	50V
2088	4822 126 13219	100	nF	25V
2090	4822 126 10002	100	nF	25V
2095	5322 122 32452	47	pF	63V
2096	5322 122 32452	47	pF	63V
2098	5322 122 31946	27	pF	50V
2101	5322 122 33861	120	pF	50V
2106	5322 122 32481	15	pF	50V
2402	5322 124 41431	22	µF	35V
2403	4822 126 10002	100	nF	25V
2404	5322 126 10223	4,7	nF	63V
2405	5322 122 32658	22	pF	50V
2406	5322 122 32658	22	pF	50V
2407	4822 124 41584	100	µF	10V
2408	4822 126 10002	100	nF	25V
2409	4822 122 33177	10	nF	50V
2410	4822 124 40433	47	µF	25V
2411	5322 126 10223	4,7	nF	63V
2412	4822 124 40433	47	µF	25V
2413	5322 122 34123	1	nF	50V
2414	4822 122 31981	33	nF	50V
2415	4822 126 10002	100	nF	25V
2416	4822 126 10002	100	nF	25V
2417	4822 124 40433	47	µF	25V
2418	4822 122 33177	10	nF	50V
2419	5322 126 10223	4,7	nF	63V
2420	4822 124 40433	47	µF	25V
2421	4822 122 33177	10	nF	50V
2422	4822 124 40433	47	µF	25V
2423	4822 126 10002	100	nF	25V
2428	5322 122 32654	22	nF	63V
2431	4822 124 40246	4,7	µF	63V
2504	4822 126 10002	100	nF	25V
2505	4822 126 10002	100	nF	25V
2506	4822 126 10002	100	nF	25V
2507	4822 124 80879	100	µF	16V
2530	5322 122 32268	470	pF	50V
2531	5322 122 32268	470	pF	50V
2540	5322 122 32268	470	pF	50V
2600	5322 122 34123	1	nF	50V
2601	5322 122 31865	1,5	nF	63V
2602	4822 126 10002	100	nF	25V
2604	4822 122 33177	10	nF	50V
2605	4822 124 40433	47	µF	25V
2606	4822 126 10002	100	nF	25V
2607	4822 126 10002	100	nF	25V
2608	5322 122 32268	470	pF	50V
2609	4822 124 40433	47	µF	25V
2610	4822 122 33175	2,2	nF	50V
2611	4822 124 40433	47	µF	25V
2612	5322 122 32654	22	nF	63V
2613	4822 122 33177	10	nF	50V
2614	4822 124 40242	1	µF	63V
2615	4822 124 40433	47	µF	25V
2616	4822 124 40433	47	µF	25V
2617	4822 124 40433	47	µF	25V
2618	5322 122 31863	330	pF	50V
2619	4822 124 40433	47	µF	25V
2620	4822 121 43526	47	nF	250V
2621	5322 122 34123	1	nF	50V
2622	4822 121 41935	12	nF	250V
2623	4822 122 33177	10	nF	50V
2624	5322 122 34123	1	nF	50V
2625	5322 121 42489	33	nF	250V
2626	4822 121 43187	27	nF	250V
2627	4822 121 41857	10	nF	250V
2628	4822 124 40433	47	µF	25V
2629	4822 124 40433	47	µF	25V
2631	4822 124 40242	1	µF	63V
2632	5322 122 32268	470	pF	50V

⚠.....Safety component, use only this type

2633	5322 124 41431	22	µF	35V	
2700	4822 126 10002	100	nF	25V	
2701	4822 126 10002	100	nF	25V	
2702	4822 126 10002	100	nF	25V	
2703	4822 124 40248	10	µF	63V	
2720	5322 122 32531	100	pF	50V	
2721	4822 122 33177	10	nF	50V	only for SECAM
2722	4822 122 33177	10	nF	50V	only for SECAM
2725	4822 126 10002	100	nF	25V	
2726	5322 122 32654	22	nF	63V	
2727	4822 124 41576	2,2	µF	50V	
2728	4822 124 40248	10	µF	63V	
2737	4822 126 10002	100	nF	25V	
2738	5322 124 41431	22	µF	35V	
2739	4822 126 10002	100	nF	25V	
2740	4822 124 41576	2,2	µF	50V	
2741	4822 126 10002	100	nF	25V	
2820	4822 122 33177	10	nF	50V	only for SECAM
2821	4822 122 33177	10	nF	50V	only for SECAM
2822	4822 126 13245	12	pF		only for SECAM
2824	4822 126 12945	8,2	pF		
2834	5322 122 32531	100	pF	50V	only for SECAM
2840	4822 124 40248	10	µF	63V	only for SECAM
2841	5322 122 32654	22	nF	63V	only for SECAM
2842	4822 124 80885	220	pF	16V	only for SECAM
2843	4822 124 40248	10	µF	63V	
2844	4822 124 80885	220	pF	16V	only for SECAM
2845	4822 124 40246	4,7	µF	63V	only for SECAM
2846	4822 124 40246	4,7	µF	63V	only for SECAM

RESISTORS

3001	4822 051 20471	470	Ω	0,1W	
3002	4822 051 20473	47	kΩ	0,1W	
3008	4822 051 20223	22	kΩ	0,1W	
3010	4822 100 12156	4,7	kΩ		
3012	4822 051 20332	3,3	kΩ	0,1W	
3017	4822 051 20103	10	kΩ	0,1W	
3018	4822 100 12156	4,7	kΩ		
3019	4822 051 20682	6,8	kΩ	0,1W	
3020	4822 100 12156	4,7	kΩ		
3021	4822 051 20272	2,7	kΩ	0,1W	
3022	4822 051 20821	820	Ω	0,1W	
3023	4822 051 10102	1	kΩ	0,25W	
3025	4822 051 20104	100	kΩ	0,1W	
3026	4822 051 20472	4,7	kΩ	0,1W	
3028	4822 051 20472	4,7	kΩ	0,1W	
3029	4822 116 52283	4,7	kΩ	0,5W	
3030	4822 051 20222	2,2	kΩ	0,1W	
3031	4822 051 20104	100	kΩ	0,1W	
3033	4822 051 10102	1	kΩ	0,25W	
3034	4822 051 20222	2,2	kΩ	0,1W	
3036	4822 051 20392	3,9	kΩ	0,1W	
3037	4822 051 20122	1,2	kΩ	0,1W	
3038	4822 051 20392	3,9	kΩ	0,1W	
3039	4822 100 12157	10	kΩ		
3040	4822 051 20222	2,2	kΩ	0,1W	
3041	4822 051 20472	4,7	kΩ	0,1W	
3043	4822 051 20561	560	Ω	0,1W	
3044	4822 051 10102	1	kΩ	0,25W	
3045	4822 051 20472	4,7	kΩ	0,1W	
3046	4822 051 20222	2,2	kΩ	0,1W	
3051	4822 051 20105	1	MΩ	0,1W	
3052	4822 051 20822	8,2	kΩ	0,1W	
3054	4822 051 20562	5,6	kΩ	0,1W	
3055	4822 051 20821	820	Ω	0,1W	
3060	4822 051 20222	2,2	kΩ	0,1W	
3061	4822 051 20101	100	Ω	0,1W	
3062	4822 051 20182	1,8	kΩ	0,1W	
3063	4822 051 20271	270	Ω	0,1W	
3064	4822 051 20561	560	Ω	0,1W	
3089	4822 051 10102	1	kΩ	0,25W	
3090	4822 051 10102	1	kΩ	0,25W	
3091	4822 051 20562	5,6	kΩ	0,1W	
3092	4822 051 20332	3,3	kΩ	0,1W	
3093	4822 051 20152	1,5	kΩ	0,1W	
3094	4822 051 20222	2,2	kΩ	0,1W	
3095	4822 051 20472	4,7	kΩ	0,1W	
3096	4822 100 12157	10	kΩ		
3097	4822 051 20332	3,3	kΩ	0,1W	
3098	4822 100 12157	10	kΩ		only for SECAM
3099	4822 100 12155	2,2	kΩ		
3100	4822 051 10102	1	kΩ	0,25W	
3104	4822 051 20472	4,7	kΩ	0,1W	
3105	4822 051 20122	1,2	kΩ	0,1W	
3106	4822 051 20271	270	Ω	0,1W	
3116	4822 051 20123	12	kΩ	0,1W	
3117	4822 051 20183	18	kΩ	0,1W	
3118	4822 051 20222	2,2	kΩ	0,1W	
3119	4822 051 20101	100	Ω	0,1W	
3128	4822 051 20223	22	kΩ	0,1W	
3132	4822 051 20681	680	Ω	0,1W	
3135	4822 051 20104	100	kΩ	0,1W	
3137	4822 051 10102	1	kΩ	0,25W	
3138	4822 051 20103	10	kΩ	0,1W	
3400	4822 051 20222	2,2	kΩ	0,1W	
3401	4822 051 10102	1	kΩ	0,25W	
3402	4822 051 20472	4,7	kΩ	0,1W	
3408	4822 051 20103	10	kΩ	0,1W	
3409	4822 050 11002	1	kΩ	0,4W	
3410	4822 116 52199	68	Ω	0,5W	
3411	4822 116 52199	68	Ω	0,5W	
3412	4822 051 20472	4,7	kΩ	0,1W	
3413	4822 116 52283	4,7	kΩ	0,5W	
3414	4822 051 20472	4,7	kΩ	0,1W	
3415	4822 051 10104	100	kΩ	0,25W	
3416	4822 116 52234	100	kΩ	0,5W	
3417	4822 116 52249	1,8	kΩ	0,5W	
3418	4822 051 20333	33	kΩ	0,1W	
3419	4822 051 10102	1	kΩ	0,25W	
3420	4822 051 20103	10	kΩ	0,1W	
3422	4822 051 20182	1,8	kΩ	0,1W	
3423	4822 051 20182	1,8	kΩ	0,1W	
3424	4822 051 20103	10	kΩ	0,1W	
3425	4822 051 20103	10	kΩ	0,1W	
3426	4822 051 20682	6,8	kΩ	0,1W	
3429	4822 051 20472	4,7	kΩ	0,1W	
3430	4822 051 20472	4,7	kΩ	0,1W	
3431	4822 051 20103	10	kΩ	0,1W	
3432	4822 051 10102	1	kΩ	0,25W	
3433	4822 051 20103	10	kΩ	0,1W	
3434	4822 051 20223	22	kΩ	0,1W	
3435	4822 051 20823	82	kΩ	0,1W	
3436	4822 051 20223	22	kΩ	0,1W	
3437	4822 051 20103	10	kΩ	0,1W	
3438	4822 051 20392	3,9	kΩ	0,1W	
3439	4822 051 20223	22	kΩ	0,1W	
3440	4822 051 20158	1,5	Ω	0,1W	
3441	4822 051 20103	10	kΩ	0,1W	
3442	4822 050 11002	1	kΩ	0,4W	
3443	4822 051 20103	10	kΩ	0,1W	
3444	4822 051 20103	10	kΩ	0,1W	
3445	4822 051 10223	22	kΩ	0,25W	
3446	4822 051 10103	10	kΩ	0,25W	
3447	4822 116 52233	10	kΩ	0,5W	
3448	4822 051 20223	22	kΩ	0,1W	
3449	4822 051 20104	100	kΩ	0,1W	
3450	4822 051 20225	2,2	MΩ	0,1W	
3451	4822 116 52233	10	kΩ	0,5W	
3452	4822 051 20393	39	kΩ	0,1W	
3453	4822 051 20472	4,7	kΩ	0,1W	
3454	4822 051 20471	470	Ω	0,1W	
3455	4822 051 20221	220	Ω	0,1W	
3456	4822 051 20472	4,7	kΩ	0,1W	
3457	4822 051 20472	4,7	kΩ	0,1W	
3458	4822 051 20472	4,7	kΩ	0,1W	
3459	4822 116 52283	4,7	kΩ	0,5W	
3461	4822 116 52175	100	Ω	0,5W	
3462	4822 116 52175	100	Ω	0,5W	
3465	4822 051 10102	1	kΩ	0,25W	
3466	4822 116 52224	470	Ω	0,5W	
3467	4822 051 20472	4,7	kΩ	0,1W	
3468	4822 116 52224	470	Ω	0,5W	

⚠.....Safety component, use only this type

FAMILY BOARD N4

3470	4822 051 20104	100	kΩ	0,1W	
3471	4822 051 20104	100	kΩ	0,1W	
3474	4822 051 20471	470	Ω	0,1W	
3475	4822 116 52256	2,2	kΩ	0,5W	
3476	4822 051 20272	2,7	kΩ	0,1W	
3477	4822 051 20103	10	kΩ	0,1W	
3478	4822 051 20472	4,7	kΩ	0,1W	
3479	4822 051 20471	470	Ω	0,1W	
3481	4822 051 20473	47	kΩ	0,1W	
3482	4822 051 20103	10	kΩ	0,1W	
3483	4822 051 20104	100	kΩ	0,1W	
3484	4822 051 20472	4,7	kΩ	0,1W	
3485	4822 051 20103	10	kΩ	0,1W	
3487	4822 051 20103	10	kΩ	0,1W	
3488	4822 051 20182	1,8	kΩ	0,1W	
3489	4822 116 52256	2,2	kΩ	0,5W	
3490	4822 051 20681	680	Ω	0,1W	
3491	4822 051 10102	1	kΩ	0,25W	
3492	4822 116 52176	10	Ω	0,5W	
3493	4822 051 20331	330	Ω	0,1W	
3494	4822 051 20101	100	Ω	0,1W	
3495	4822 051 20101	100	Ω	0,1W	
3496	4822 116 52176	10	Ω	0,5W	
3498	4822 050 11002	1	kΩ	0,4W	
3499	4822 051 20223	22	kΩ	0,1W	
3500	4822 051 10102	1	kΩ	0,4W	only for PAL
3501	4822 051 10102	1	kΩ	0,4W	only for PAL
3502	4822 051 10102	1	kΩ	0,4W	only for PAL
3503	4822 116 52224	470	Ω	0,5W	
3504	4822 051 20104	100	kΩ	0,1W	
3505	4822 116 52271	33	kΩ	0,5W	
3506	4822 051 10102	1	kΩ	0,4W	only for PAL
3516	4822 051 20472	4,7	kΩ	0,1W	only for PAL
3517	4822 050 11002	1	kΩ	0,4W	
3519	4822 116 52243	1,5	kΩ	0,5W	
3520	4822 051 20829	82	Ω	0,1W	
3521	4822 051 20829	82	Ω	0,1W	
3522	4822 051 20829	82	Ω	0,1W	
3530	4822 051 20682	6,8	kΩ	0,1W	
3531	4822 051 20682	6,8	kΩ	0,1W	
3532	4822 051 20224	220	kΩ	0,1W	
3533	4822 051 20332	3,3	kΩ	0,1W	
3534	4822 051 20332	3,3	kΩ	0,1W	
3535	4822 051 10473	47	kΩ	0,25W	
3536	4822 051 20105	1	MΩ	0,1W	
3537	4822 051 20562	5,6	kΩ	0,1W	
3538	4822 051 10102	1	kΩ	0,25W	
3539	4822 116 52233	10	kΩ	0,5W	
3540	4822 051 20471	470	Ω	0,1W	
3596	4822 051 20103	10	kΩ	0,1W	
3597	4822 051 20104	100	kΩ	0,1W	
3600	4822 051 20479	47	Ω	0,1W	
3601	4822 051 20104	100	kΩ	0,1W	
3602	4822 051 20331	330	Ω	0,1W	
3603	4822 051 20123	12	kΩ	0,1W	
3604	4822 051 20394	390	kΩ	0,1W	
3605	4822 051 20101	100	Ω	0,1W	
3606	4822 100 12157	10	kΩ		
3607	4822 051 20105	1	MΩ	0,1W	
3608	4822 051 20473	47	kΩ	0,1W	
3610	4822 051 20103	10	kΩ	0,1W	
3611	4822 116 52271	33	kΩ	0,5W	
3612	4822 051 20103	10	kΩ	0,1W	
3613	4822 116 52256	2,2	kΩ	0,5W	
3614	4822 051 20103	10	kΩ	0,1W	
3615	4822 051 20471	470	Ω	0,1W	
3616	4822 051 10102	1	kΩ	0,25W	
3617	4822 051 20223	22	kΩ	0,1W	
3618	4822 100 12159	100	kΩ		
3619	4822 051 20158	1,5	Ω	0,1W	
3620	4822 051 20473	47	kΩ	0,1W	
3621	4822 051 20103	10	kΩ	0,1W	
3623	4822 051 20103	10	kΩ	0,1W	
3624	4822 051 20332	3,3	kΩ	0,1W	
3625	4822 051 20339	33	Ω	0,1W	
3626	4822 051 20479	47	Ω	0,1W	
3627	4822 051 20332	3,3	kΩ	0,1W	
3628	4822 051 20103	10	kΩ	0,1W	
3630	4822 051 20333	33	kΩ	0,1W	
3631	4822 051 20158	1,5	Ω	0,1W	
3632	4822 051 20331	330	Ω	0,1W	
3633	4822 051 20331	330	Ω	0,1W	
3634	4822 051 20183	18	kΩ	0,1W	
3635	4822 116 52283	4,7	kΩ	0,5W	
3636	4822 051 20473	47	kΩ	0,1W	
3637	4822 051 20109	10	Ω	0,1W	
3638	4822 051 20109	10	Ω	0,1W	
3701	4822 051 10102	1	kΩ	0,25W	
3702	4822 051 20101	100	Ω	0,1W	
3703	4822 051 20101	100	Ω	0,1W	
3704	4822 051 20123	12	kΩ	0,1W	
3705	4822 051 20103	10	kΩ	0,1W	
3707	4822 051 20103	10	kΩ	0,1W	only for SECAM
3708	4822 051 20103	10	kΩ	0,1W	only for PAL
3720	4822 051 20822	8,2	kΩ	0,1W	only for SECAM
3721	4822 051 20122	1,2	kΩ	0,1W	only for SECAM
3723	4822 051 20104	100	kΩ	0,1W	
3725	4822 051 20682	6,8	kΩ	0,1W	
3726	4822 051 20223	22	kΩ	0,1W	
3727	4822 051 20152	1,5	kΩ	0,1W	
3728	4822 051 20563	56	kΩ	0,1W	
3729	4822 051 20332	3,3	kΩ	0,1W	
3730	4822 051 20183	18	kΩ	0,1W	
3731	4822 051 20183	18	kΩ	0,1W	
3737	4822 051 20222	2,2	kΩ	0,1W	
3739	4822 051 20473	47	kΩ	0,1W	
3741	4822 100 12156	4,7	kΩ		only for SECAM
3742	4822 100 12158	22	kΩ		
3743	4822 051 20271	270	Ω	0,1W	only for PAL
3743	4822 051 20221	220	Ω	0,1W	only for SECAM
3744	4822 051 20104	100	kΩ	0,1W	
3745	4822 051 20561	560	Ω	0,1W	
3746	4822 051 20561	560	Ω	0,1W	only for SECAM
3749	4822 051 20561	560	Ω	0,1W	
3760	4822 051 20222	2,2	kΩ	0,1W	
3762	4822 051 20222	2,2	kΩ	0,1W	
3782	4822 051 20272	2,7	kΩ	0,1W	
3820	4822 051 20822	8,2	kΩ	0,1W	only for SECAM
3821	4822 051 20822	8,2	kΩ	0,1W	only for SECAM
3822	4822 051 20104	100	kΩ	0,1W	only for SECAM
3823	4822 100 12159	100	kΩ		only for SECAM
3824	4822 051 20104	100	kΩ	0,1W	only for SECAM
3825	4822 051 20104	100	kΩ	0,1W	only for SECAM
3826	4822 051 10103	10	kΩ	0,25W	only for SECAM
3827	4822 051 20332	3,3	kΩ	0,1W	only for SECAM
3829	4822 051 20103	10	kΩ	0,1W	only for SECAM
3831	4822 051 20104	100	kΩ	0,1W	only for SECAM
3832	4822 051 20104	100	kΩ	0,1W	only for SECAM
3833	4822 051 20103	10	kΩ	0,1W	only for SECAM
3834	4822 051 20103	10	kΩ	0,1W	only for SECAM
3835	4822 051 10103	10	kΩ	0,25W	only for SECAM
3854	4822 051 10008	0	Ω	0,25W	
3855	4822 051 10008	0	Ω	0,25W	
3858	4822 051 20008	0	Ω	0,1W	
3859	4822 051 10008	0	Ω	0,25W	
3904	4822 051 10008	0	Ω	0,25W	
3907	4822 051 20008	0	Ω	0,1W	
3911	4822 051 20008	0	Ω	0,1W	
3913	4822 051 10008	0	Ω	0,25W	
3914	4822 051 20008	0	Ω	0,1W	
3915	4822 051 10008	0	Ω	0,25W	
3916	4822 051 10008	0	Ω	0,25W	
3918	4822 051 10008	0	Ω	0,25W	
3920	4822 051 10008	0	Ω	0,25W	
3921	4822 051 10008	0	Ω	0,25W	
3922	4822 051 20008	0	Ω	0,1W	
3923	4822 051 10008	0	Ω	0,25W	
3924	4822 051 10008	0	Ω	0,25W	
3925	4822 051 20008	0	Ω	0,1W	
3926	4822 051 20008	0	Ω	0,1W	
3927	4822 051 10008	0	Ω	0,25W	
3928	4822 051 10008	0	Ω	0,25W	
3930	4822 051 20008	0	Ω	0,1W	only for SECAM
3931	4822 051 20008	0	Ω	0,1W	
3932	4822 051 10008	0	Ω	0,25W	
3933	4822 051 20008	0	Ω	0,1W	
3940	4822 051 20008	0	Ω	0,1W	only for PAL

COILS

5002	4822 157 53253	27 µH	
5003	4822 157 53265	100 µH	
5004	4822 157 52842	15 µH	
5005	4822 157 53253	27 µH	
5006	4822 157 53251	8,2 µH	
5014	4822 157 53251	8,2 µH	
5015	4822 157 63676	56 µH	
5016	4822 157 53253	27 µH	
5017	4822 157 63676	56 µH	
5021	4822 157 50961	22 µH	
5023	4822 157 63675	330 µH	only for SECAM
5024	4822 157 63678	560 µH	only for SECAM
5025	4822 157 53253	27 µH	
5401	4822 157 50961	22 µH	
5402	4822 157 53005		
5501	4822 157 52285	6,8 µH	
5601	4822 157 70038		
5603	4822 157 53531		
5604	4822 157 53531		
5605	4822 157 62681		
5700	4822 157 52285	6,8 µH	
5720	4822 157 62681		
5723	4822 157 53251	8,2 µH	
5724	4822 157 53251	8,2 µH	
5725	4822 157 70877		
5727	4822 157 52285	6,8 µH	
5728	4822 157 52285	6,8 µH	
5740	4822 157 71184	10 µH	

DIODES

6002	4822 130 30621	1N4148	
6004	4822 130 31983	BAT85	
6401	4822 130 30621	1N4148	
6402	4822 130 30621	1N4148	
6403	4822 130 34233	BZX79-B5V1	
6404	4822 130 34278	BZX79-B6V8	
6406	4822 130 30621	1N4148	
6504	4822 130 31024	BZX79-B18	
6505	4822 130 34278	BZX79-B6V8	
6508	4822 130 34278	BZX79-B6V8	
6520	4822 130 34197	BZX79-B12	
6522	4822 130 34197	BZX79-B12	
6530	4822 130 34197	BZX79-B12	
6531	4822 130 34197	BZX79-B12	
6540	4822 130 34197	BZX79-B12	
6720	5322 130 32076	BAT18	only for SECAM
6721	5322 130 32076	BAT18	only for SECAM
6820	4822 130 83702	BB811	only for SECAM
6821	4822 130 83703	BA582	only for SECAM
6822	4822 130 83703	BA582	only for SECAM
6823	5322 130 32076	BAT18	only for SECAM
6824	5322 130 32076	BAT18	only for SECAM

TRANSISTORS & IC's

7000	5322 130 41983	BC858B	
7004	4822 209 30692	MSM7403RS	
7005	4822 130 60729	DTC124EEKT-96	
7006	5322 130 41983	BC858B	
7007	5322 130 41982	BC848B	
7010	5322 130 41983	BC858B	
7014	5322 209 11306	HEF4094BT	
7015	4822 130 61495	DTA124EK	
7016	5322 130 41982	BC848B	
7021	5322 130 41982	BC848B	
7024	4822 130 60729	DTC124EEKT-96	
7025	5322 130 41982	BC848B	
7026	5322 130 41982	BC848B	
7027	4822 130 60729	DTC124EEKT-96	
7029	4822 130 42353	BSF19-F2	
7030	5322 130 41982	BC848B	
7031	5322 130 41982	BC848B	
7032	5322 130 41982	BC848B	
7037	5322 130 41983	BC858B	
7038	4822 130 61495	DTA124EK	
7051	4822 209 32155	LA7191	
7053	4822 209 60177	LM339D	
7402	4822 209 30146	L2722	
7403	5322 130 41982	BC848B	
7404	5322 130 41982	BC848B	
7405	4822 130 61495	DTA124EK	
7406	4822 130 60089	BD436	
7407	5322 130 41982	BC848B	
7408	4822 130 60729	DTC124EEKT-96	
7410	4822 209 33473	TMP91C642AN/NTDP4-1U	
7411	4822 209 30836	SAA1310/N2	
7412	4822 209 32709	ST24C04CB1	
7413	5322 209 11306	HEF4094BT	
7420	5322 130 41982	BC848B	
7421	5322 130 41982	BC848B	
7423	4822 130 44283	BC636	
7424	4822 130 44283	BC636	
7500	5322 130 41983	BC858B	only for PAL
7501	5322 130 41983	BC858B	
7502	4822 130 60729	DTC124EEKT-96	
7503	5322 130 41983	BC858B	
7504	4822 130 60729	DTC124EEKT-96	
7506	5322 130 41982	BC848B	only for PAL
7592	5322 209 11102	HEF4052BT	
7601	4822 209 31548	LA7282	
7602	4822 130 60729	DTC124EEKT-96	
7604	4822 130 41715	BC328-40	
7605	4822 130 60729	DTC124EEKT-96	
7606	5322 130 41982	BC848B	
7607	4822 130 41715	BC328-40	
7608	5322 130 41983	BC858B	
7609	4822 130 42615	BC817-40	
7610	5322 130 41982	BC848B	
7611	5322 130 41982	BC848B	
7612	4822 130 42615	BC817-40	
7613	5322 130 41983	BC858B	
7720	4822 209 31554	TDA9800/V3	only for PAL
7720	4822 209 31554	TDA9802/V3	only for SECAM
7721	5322 130 41982	BC848B	
7723	5322 130 41983	BC858B	
7727	5322 130 41982	BC848B	only for SECAM
7761	5322 130 41983	BC858B	
7823	5322 130 41982	BC848B	only for SECAM
7824	5322 130 41982	BC848B	only for SECAM
7840	4822 209 31555	TDA9830/V1	only for SECAM

⚠.....Safety component, use only this type

FAMILY BOARD N4

⚠.....Safety component, use only this type

CHROMA SECAM PROCESSING CSP PANEL

CAPACITORS

2053	5322 122 34123	1	nF	50V
2200	4822 122 33177	10	nF	50V
2201	5322 122 32658	22	pF	50V
2202	5322 122 34123	1	nF	50V
2203	5322 122 32531	100	pF	50V
2204	4822 122 33177	10	nF	50V
2205	5322 122 34123	1	nF	50V
2206	5322 122 32659	33	pF	50V
2207	4822 122 33177	10	nF	50V
2208	4822 122 33177	10	nF	50V
2209	4822 122 31947	100	nF	63V
2210	4822 122 33177	10	nF	50V
2212	4822 122 33177	10	nF	50V
2213	5322 122 34123	1	nF	50V
2214	4822 122 31947	100	nF	63V
2216	4822 122 33575	220	pF	50V
2217	4822 122 31947	100	nF	63V
2218	4822 122 31947	100	nF	63V
2219	4822 122 33177	10	nF	50V
2220	4822 122 32442	10	nF	50V
2222	5322 122 32658	22	pF	50V
2223	5322 122 32531	100	pF	50V
2224	5322 122 33538	150	pF	63V
2225	4822 122 33177	10	nF	50V
2240	4822 122 31797	22	nF	63V

RESISTORS

3053	4822 051 20223	22	kΩ	0,1W
3056	4822 051 10102	1	kΩ	0,25W
3200	4822 051 20331	330	Ω	0,1W
3201	4822 051 20332	3,3	kΩ	0,1W
3202	4822 051 20821	820	Ω	0,1W
3203	4822 051 20681	680	Ω	0,1W
3204	4822 051 10102	1	kΩ	0,25W
3205	4822 051 20391	390	Ω	0,1W
3206	4822 051 20821	820	Ω	0,1W
3207	4822 051 10102	1	kΩ	0,25W
3208	4822 051 20122	1,2	kΩ	0,1W
3209	4822 051 20222	2,2	kΩ	0,1W
3211	4822 051 10102	1	kΩ	0,25W
3212	4822 051 20152	1,5	kΩ	0,1W
3213	4822 051 20103	10	kΩ	0,1W
3214	4822 051 20333	33	kΩ	0,1W
3221	4822 051 20222	2,2	kΩ	0,1W
3224	4822 051 20222	2,2	kΩ	0,1W
3225	4822 051 10102	1	kΩ	0,25W
3226	4822 051 20183	18	kΩ	0,1W
3227	4822 051 20222	2,2	kΩ	0,1W
3228	4822 051 20152	1,5	kΩ	0,1W
3229	4822 051 20103	10	kΩ	0,1W
3232	4822 051 10102	1	kΩ	0,25W
3233	4822 051 20561	560	Ω	0,1W
3234	4822 051 20472	4,7	kΩ	0,1W
3240	4822 051 10102	1	kΩ	0,25W
3241	4822 051 20473	47	kΩ	0,1W
3242	4822 051 20473	47	kΩ	0,1W
3243	4822 051 10102	1	kΩ	0,25W
3901	4822 051 20008	0	Ω	0,1W
3902	4822 051 20008	0	Ω	0,1W

COILS

5201	4822 157 63661		
5202	4822 157 63661		
5203	4822 157 63676	56	µH
5204	4822 157 52842	15	µH
5205	4822 157 63675	330	µH
5207	4822 157 63659		
5209	4822 156 21456		
5211	4822 156 21459		
5213	4822 157 63678	560	µH
5214	4822 157 53265	100	µH

TRANSISTORS & IC's

7200	4822 130 42353	BSF19-F2
7201	5322 130 41982	BC848B
7202	4822 209 73852	PMBT2369
7203	5322 130 41982	BC848B
7205	5322 130 41982	BC848B
7207	4822 130 60145	DTC124E/25
7240	5322 130 41982	BC848B
7520	4822 209 73599	TDA4725/V2

⚠.....Safety component, use only this type

CONNECTORS

	4822 265 41295	15 pin
	4822 265 51352	Scart

CAPACITORS

2510	4822 122 31947	100	nF		
2511	4822 124 80454	10	µF	16V	
2541	4822 124 40248	10	µF	63V	
2561	4822 124 80454	10	µF	16V	
2570	4822 122 31727	470	pF	63V	
2571	4822 122 31727	470	pF	63V	
2580	4822 122 31727	470	pF	63V	
2581	4822 124 40248	10	µF	63V	
2590	4822 122 31947	100	nF	63V	
2591	4822 122 32442	10	nF	50V	
2600	4822 122 31825	27	pF		only for VPS
2601	4822 122 31981	33	nF		only for VPS
2602	4822 122 31947	100	nF		only for VPS
2603	4822 122 31947	100	nF	63V	

RESISTORS

3508	4822 051 10471	470	Ω	0,25W	
3509	4822 051 10561	560	Ω	0,25W	
3511	4822 051 10471	470	Ω		
3512	4822 051 10122	1,2	kΩ		
3513	4822 051 10123	12	kΩ		
3514	4822 051 10123	12	kΩ	0,25W	
3515	4822 051 10103	10	kΩ	0,25W	
3516	4822 051 10229	22	Ω		
3517	4822 051 10101	100	Ω		
3518	4822 051 10101	100	Ω		
3541	4822 051 10104	100	kΩ	0,25W	
3542	4822 051 10472	4,7	kΩ	0,25W	
3550	4822 051 10829	82	Ω	0,25W	
3551	4822 051 10682	6,8	kΩ	0,25W	
3560	4822 051 10102	1	kΩ		
3561	4822 051 10471	470	Ω		
3562	4822 051 10122	1,2	kΩ		
3563	4822 051 10123	12	kΩ		
3564	4822 051 10123	12	kΩ	0,25W	
3565	4822 051 10103	10	kΩ	0,25W	
3566	4822 051 10101	100	Ω		
3567	4822 051 10101	100	Ω		
3568	4822 051 10229	22	Ω		
3570	4822 051 10682	6,8	kΩ	0,25W	
3571	4822 051 10682	6,8	kΩ	0,25W	
3572	4822 051 10224	220	kΩ	0,25W	
3581	4822 051 10104	100	kΩ	0,25W	
3582	4822 051 10472	4,7	kΩ	0,25W	
3583	4822 051 10224	220	kΩ	0,25W	
3584	4822 051 10471	470	Ω	0,25W	
3600	4822 051 10101	100	Ω	1/8W	only for VPS
3601	4822 051 10101	100	Ω	1/8W	only for VPS
3602	4822 051 10332	3,3	kΩ	1/8W	only for VPS
3603	4822 051 10682	6,8	kΩ	1/8W	only for VPS
3604	4822 051 10105	1	MΩ	1/8W	only for VPS
3605	4822 051 10562	5,6	kΩ	1/8W	only for VPS
3606	4822 051 10105	1	MΩ	1/8W	only for VPS
3607	4822 051 10101	100	Ω	1/8W	only for VPS
3608	4822 051 10104	100	kΩ	1/8W	only for VPS
3609	4822 051 10105	1	MΩ	1/8W	only for VPS
3802	4822 051 10008	0	Ω	0,25W	
3906	4822 051 10008	0	Ω	0,25W	
3910	4822 051 10008	0	Ω	0,25W	
3911	4822 051 10008	0	Ω	0,25W	
3913	4822 051 10008	0	Ω	0,25W	
3920	4822 051 10008	0	Ω	0,25W	

DIODES

6550	4822 130 34197	BZX79-B12
6551	4822 130 30621	1N4148
6552	4822 130 30621	1N4148
6560	4822 130 34197	BZX79-B12
6561	4822 130 34197	BZX79-B12
6562	4822 130 34197	BZX79-B12
6563	4822 130 34197	BZX79-B12
6564	4822 130 31024	BZX79-B18
6565	4822 130 30621	1N4148
6566	4822 130 30621	1N4148
6570	4822 130 34197	BZX79-B12
6571	4822 130 34197	BZX79-B12
6580	4822 130 34197	BZX79-B12
6590	4822 130 31024	BZX79-B18

TRANSISTORS & IC's

7509	5322 130 41983	BC858B	
7510	4822 130 42353	BFS19	
7511	5322 130 41983	BC858B	
7540	5322 130 41982	BC848B	
7550	4822 130 42616	BC818-40	
7560	4822 130 42353	BFS19	
7562	5322 130 41983	BC858B	
7580	5322 130 41982	BC848B	
7590	5322 209 10576	HEF4053BD	
7591	5322 209 10576	HEF4053BD	
7593	5322 130 41982	BC848B	
7594	5322 130 41982	BC848B	
7600	4822 209 73306	VPS IC SDA5642	only for VPS

⚠.....Safety component, use only this type

CONNECTORS

	4822 265 41295	15 pin
	4822 265 31086	6 pin
	4822 265 51352	Scart

MISCELLANEOUS

1000	4822 242 81099	Crystal 12 MHz
1200	4822 242 81471	Crystal 27 MHz
1300	4822 320 40186	Delay line

CAPACITORS

2001	4822 122 31947	100	nF	63V
2002	5322 122 32658	22	pF	50V
2003	5322 122 32658	22	pF	50V
2004	4822 122 33177	10	nF	50V
2005	5322 122 34123	1	nF	50V
2010	4822 122 31947	100	nF	63V
2020	4822 122 31947	100	nF	63V
2030	4822 122 31947	100	nF	63V
2200	4822 122 31947	100	nF	63V
2201	4822 124 80231	47	µF	16V
2202	4822 122 31797	22	nF	63V
2204	4822 122 31947	100	nF	63V
2206	4822 122 31947	100	nF	63V
2207	5322 122 34123	1	nF	50V
2208	5322 122 32448	10	pF	50V
2209	5322 122 32481	15	pF	50V
2210	4822 122 31947	100	nF	63V
2211	4822 122 31947	100	nF	63V
2250	4822 124 22826	10	µF	16V
2251	5322 122 32654	22	nF	63V
2300	4822 124 22826	10	µF	16V
2301	4822 122 31947	100	nF	63V
2302	4822 122 31947	100	nF	63V
2303	4822 122 32442	10	nF	50V
2304	5322 122 34123	1	nF	50V
2305	4822 122 33177	10	nF	50V
2306	4822 122 31947	100	nF	63V
2307	4822 122 31947	100	nF	63V
2308	5322 122 34123	1	nF	50V
2309	5322 122 33861	120	pF	50V
2310	4822 122 33177	10	nF	50V
2311	5322 122 32661	56	pF	50V
2312	4822 124 80227	2,2	µF	35V
2313	4822 124 80227	2,2	µF	35V
2314	4822 124 80227	2,2	µF	35V
2340	4822 122 31947	100	nF	63V
2350	5322 122 32481	15	pF	50V
2351	4822 122 32442	10	nF	50V
2352	5322 122 34123	1	nF	
2370	4822 124 80231	47	µF	16V
2371	4822 122 32891	68	nF	63V
2372	4822 122 33177	10	nF	50V
2400	4822 122 31947	100	nF	63V
2401	4822 122 31947	100	nF	63V
2402	4822 122 31947	100	nF	63V
2403	4822 122 31947	100	nF	63V
2404	4822 122 31947	100	nF	63V
2405	5322 122 33861	120	pF	50V
2511	4822 124 80535	10	µF	16V
2541	4822 124 22826	10	µF	16V
2561	4822 124 80535	10	µF	16V
2570	5322 122 32268	470	pF	50V
2571	5322 122 32268	470	pF	50V
2580	5322 122 32268	470	pF	50V
2581	4822 124 22826	10	µF	16V
2590	4822 122 33177	10	nF	50V
2591	4822 122 32442	10	nF	50V

RESISTORS

3000	4822 051 20472	4,7	kΩ	0,1W
3001	4822 051 20472	4,7	kΩ	0,1W
3003	4822 051 20472	4,7	kΩ	0,1W
3004	4822 051 20472	4,7	kΩ	0,1W
3010	4822 051 10102	1	kΩ	0,25W
3011	4822 051 20181	180	Ω	0,1W
3200	4822 051 20101	100	Ω	0,1W
3201	4822 051 20101	100	Ω	0,1W
3202	4822 051 20681	680	Ω	0,1W
3203	4822 051 20332	3,3	kΩ	0,1W
3204	4822 051 20151	150	Ω	0,1W
3205	4822 051 20273	27	kΩ	0,1W
3300	4822 051 10822	8,2	kΩ	0,25W
3301	4822 051 20222	2,2	kΩ	0,1W
3302	4822 051 20224	220	kΩ	0,1W
3303	4822 051 10563	56	kΩ	0,25W
3304	4822 051 10102	1	kΩ	0,25W
3305	4822 051 20681	680	Ω	0,1W
3306	4822 051 10102	1	kΩ	0,25W
3307	4822 051 10102	1	kΩ	0,25W
3340	4822 051 20105	1	MΩ	0,1W
3341	4822 051 20332	3,3	kΩ	0,1W
3350	4822 051 20471	470	Ω	0,1W
3351	4822 051 20471	470	Ω	0,1W
3352	4822 051 20221	220	Ω	0,1W
3370	4822 051 20101	100	Ω	0,1W
3371	4822 051 20479	47	Ω	0,1W
3372	4822 051 20271	270	Ω	0,1W
3373	4822 051 20225	2,2	MΩ	0,1W
3374	4822 051 20223	22	kΩ	
3400	4822 051 20103	10	kΩ	0,1W
3401	4822 051 20103	10	kΩ	0,1W
3403	4822 051 20472	4,7	kΩ	
3404	4822 051 20221	220	Ω	0,1W
3405	4822 051 10102	1	kΩ	0,25W
3406	4822 051 10102	1	kΩ	0,25W
3407	4822 051 20122	1,2	kΩ	
3408	4822 051 10102	1	kΩ	0,25W
3409	4822 051 20472	4,7	kΩ	0,1W
3451	4822 051 20472	4,7	kΩ	
3452	4822 051 20472	4,7	kΩ	
3501	4822 051 20222	2,2	kΩ	0,1W
3510	4822 051 10102	1,0	kΩ	
3511	4822 051 20471	470	Ω	
3512	4822 051 20122	1,2	kΩ	
3513	4822 051 20123	12	kΩ	
3514	4822 051 20123	12	kΩ	0,1W
3515	4822 051 20103	10	kΩ	0,1W
3516	4822 051 20471	470	Ω	
3517	4822 051 20471	470	Ω	
3518	4822 051 20229	22	Ω	
3519	4822 051 20101	100	Ω	
3520	4822 051 20101	100	Ω	
3530	4822 051 20109	10	Ω	
3541	4822 051 10104	100	kΩ	0,25W
3542	4822 051 20472	4,7	kΩ	0,1W
3550	4822 051 20829	82	Ω	0,1W
3560	4822 051 20229	22	Ω	
3561	4822 051 10102	1,0	kΩ	
3562	4822 051 20122	1,2	kΩ	
3563	4822 051 20123	12	kΩ	
3564	4822 051 20123	12	kΩ	0,1W
3565	4822 051 20103	10	kΩ	0,1W
3566	4822 051 20471	470	Ω	
3567	4822 051 20101	100	Ω	
3568	4822 051 20101	100	Ω	
3570	4822 051 20682	6,8	kΩ	
3571	4822 051 20682	6,8	kΩ	
3572	4822 051 20224	220	kΩ	0,1W
3580	4822 051 20471	470	Ω	0,1W
3581	4822 051 20104	100	kΩ	0,1W
3582	4822 051 20472	4,7	kΩ	0,1W
3583	4822 051 20224	220	kΩ	0,1W
3590	4822 051 10682	6,8	kΩ	0,25W

⚠.....Safety component, use only this type

COILS

5000	4822 157 70503	4,7	µH
5010	4822 157 70503	4,7	µH
5020	4822 157 70503	4,7	µH
5030	4822 157 70503	4,7	µH
5200	4822 157 63343		
5201	4822 157 70503	4,7	µH
5250	4822 157 53265	100	µH
5300	4822 157 63343		
5301	4822 157 53252	22	µH
5370	4822 157 70131		
5400	4822 157 63343		

DIODES

6550	4822 130 33699	BZX84-C12
6551	5322 130 34331	BAV70
6560	4822 130 33699	BZX84-C12
6561	5322 130 34331	BAV70
6570	4822 130 33699	BZX84-C12
6571	4822 130 33699	BZX84-C12
6580	4822 130 33699	BZX84-C12
6590	4822 130 33699	BZX84-C12
6592	4822 130 33699	BZX84-C12

TRANSISTORS & IC's

7000	4822 209 32331	SAB 8032 WITH SOCKET
7020	5322 209 31276	PC74HCT573T
7030	4822 209 31553	FCB61C65LL-70T
7200	4822 209 32328	SAA5248GP/E
7250	4822 209 31553	FCB61C65LL-70T
7300	4822 209 71415	MC1377P
7340	5322 130 41982	BC848B
7350	5322 130 41982	BC848B
7351	5322 130 41982	BC848B
7370	5322 130 41982	BC848B
7371	5322 130 41982	BC848B
7372	5322 130 41982	BC848B
7400	4822 209 32327	BA7605N
7401	5322 130 41983	BC858B
7402	4822 130 61495	DTA 124EK
7403	5322 130 41982	BC848B
7404	4822 209 73852	PMBT 2369
7405	5322 130 41983	BC858B
7511	5322 130 41983	BC858B
7512	4822 130 42353	BFS19
7513	5322 130 41983	BC858B
7540	5322 130 41982	BC848B
7561	5322 130 41982	BC848B
7562	4822 130 42353	BFS19
7563	5322 130 41983	BC858B
7580	5322 130 41982	BC848B
7590	5322 209 14481	HEF4053BT
7591	5322 209 14481	HEF4053BT
7595	4822 130 42616	BC818-40

⚠.....Safety component, use only this type

IN/OUT, OSD, VPS NIO PANEL

MISCELLANEOUS

	4822 265 41295	15 pin	

CAPACITORS

2510	4822 126 10002	100	nF	25V	
2511	4822 124 80535	10	µF	16V	
2541	4822 124 22826	10	µF	16V	
2560	4822 126 10002	100	nF	25V	
2561	4822 124 80535	10	µF	16V	
2570	5322 122 32268	470	pF	50V	
2571	5322 122 32268	470	pF	50V	
2580	5322 122 32268	470	pF	50V	
2581	4822 124 22826	10	µF	16V	
2590	4822 126 10002	100	nF	25V	
2591	4822 122 33177	10	nF	50V	
2600	5322 12231946	27	pF	50V	only for VPS
2602	4822 126 10002	100	nF	50V	only for PDC
2603	4822 126 10002	100	nF	50V	only for VPS
2850	4822 124 22826	10	µF	16V	
2851	4822 124 22826	10	µF	16V	
2852	5322 126 10223	4,7	nF	63V	
2853	5322 116 80853	560	pF	63V	
2854	5322 126 10223	4,7	nF	63V	
2855	5322 116 80853	560	pF	63V	
2858	4822 124 22826	10	µF	16V	
2860	4822 126 10002	100	nF	25V	

RESISTORS

3508	4822 051 20471	470	Ω	0,1W	
3509	4822 051 20471	470	Ω	0,1W	
3510	4822 051 10102	1	kΩ	0,25W	
3511	4822 051 20471	470	Ω	0,1W	
3512	4822 051 20122	1,2	kΩ	0,1W	
3513	4822 051 20393	39	kΩ	0,1W	
3514	4822 051 20123	12	kΩ	0,1W	
3515	4822 051 20103	10	kΩ	0,1W	
3516	4822 116 52191	33	Ω	0,5W	
3541	4822 051 20104	100	kΩ	0,1W	
3542	4822 051 20472	4,7	kΩ	0,1W	
3550	4822 051 20829	82	Ω	0,1W	
3551	4822 051 20682	6,8	kΩ	0,1W	
3560	4822 051 10102	1	kΩ	0,25W	
3561	4822 051 20471	470	Ω	0,1W	
3562	4822 051 20122	1,2	kΩ	0,1W	
3563	4822 051 20393	39	kΩ	0,1W	
3564	4822 051 20123	12	kΩ	0,1W	
3565	4822 051 20103	10	kΩ	0,1W	
3566	4822 051 20101	100	Ω	0,1W	
3567	4822 051 20229	22	Ω	0,1W	
3568	4822 051 20101	100	Ω	0,1W	
3570	4822 051 20682	6,8	kΩ	0,1W	
3571	4822 051 20682	6,8	kΩ	0,1W	
3572	4822 051 20224	220	kΩ	0,1W	
3581	4822 051 20104	100	kΩ	0,1W	
3582	4822 051 20472	4,7	kΩ	0,1W	
3583	4822 051 20224	220	kΩ	0,1W	
3584	4822 051 20471	470	Ω	0,1W	
3600	4822 051 20101	100	Ω	0,1W	only for VPS
3601	4822 051 20101	100	Ω	0,1W	only for VPS
3602	4822 051 20332	3,3	kΩ	0,1W	only for VPS
3603	4822 051 20682	6,8	kΩ	0,1W	only for VPS
3604	4822 051 20105	1,0	MΩ	0,1W	only for VPS
3605	4822 051 20562	5,6	kΩ	0,1W	only for PDC
3606	4822 051 20105	1,0	MΩ	0,1W	only for VPS
3607	4822 051 20101	100	Ω	0,1W	only for VPS
3608	4822 051 20104	100	kΩ	0,1W	only for VPS
3609	4822 051 20105	1,0	MΩ	0,1W	only for VPS
3850	4822 051 20153	15	kΩ	0,1W	
3851	4822 051 20103	10	kΩ	0,1W	
3852	4822 051 20103	10	kΩ	0,1W	
3853	4822 051 20103	10	kΩ	0,1W	
3854	4822 051 20153	15	kΩ	0,1W	
3855	4822 051 20103	10	kΩ	0,1W	
3856	4822 051 20222	2,2	kΩ	0,1W	
3857	4822 051 20472	4,7	kΩ	0,1W	
3858	4822 051 20222	2,2	kΩ	0,1W	
3859	4822 051 20008	0	Ω	0,1W	
3860	4822 051 20472	4,7	kΩ	0,1W	
3861	4822 051 20223	22	kΩ	0,1W	
3862	4822 051 20153	15	kΩ	0,1W	
3863	4822 051 20104	100	kΩ	0,1W	
3864	4822 051 20472	4,7	kΩ	0,1W	
3865	4822 051 20472	4,7	kΩ	0,1W	
3866	4822 051 20475	4,7	MΩ	0,1W	
3867	4822 051 20475	4,7	MΩ	0,1W	
3901	4822 051 20008	0	Ω	0,1W	
3905	4822 051 10008	0	Ω	0,25W	
3907	4822 051 10008	0	Ω	0,25W	
3912	4822 051 10008	0	Ω	0,25W	
3915	4822 051 20008	0	Ω	0,1W	
3922	4822 051 10008	0	Ω	0,25W	
3923	4822 051 10008	0	Ω	0,25W	

DIODES

6550	4822 130 34197	BZX79-B12	
6551	4822 130 30621	1N4148	
6552	4822 130 30621	1N4148	
6560	4822 130 34197	BZX79-B12	
6564	4822 130 31024	BZX79-B18	
6565	5322 130 34331	BAV70	
6567	4822 130 30621	1N4148	
6570	4822 130 34197	BZX79-B12	
6571	4822 130 34197	BZX79-B12	
6580	4822 130 34197	BZX79-B12	
6590	4822 130 31024	BZX79-B18	

TRANSISTORS & IC's

7509	5322 130 41983	BC858B	
7510	4822 130 42353	BSF19-F2	
7511	5322 130 41983	BC858B	
7540	5322 130 41982	BC848B	
7550	4822 130 42616	BC818-40	
7560	4822 130 42353	BSF19-F2	
7562	5322 130 41983	BC858B	
7580	5322 130 41982	BC848B	
7590	5322 209 14481	HEF4053BT	
7591	5322 209 14481	HEF4053BT	
7593	5322 130 41982	BC848B	
7600	4822 209 32728	SDA5642-5	only for VPS
7851	5322 130 41982	BC848B	
7852	5322 130 41982	BC848B	

⚠.....Safety component, use only this type

HEAD AMPLIFIERS LHA

4822 214 33714	LHA 2/0
4822 214 33761	LHA 3/0
4822 214 33666	LHA 4/0

NFM PANEL

4822 214 60168	NFM

CABLES

4822 321 61675	Cable chinch	not for N4
4822 320 50318	Cable B6 - L8	only for N4
4822 320 50293	Cable SM1 - F1	not for N4
4822 321 61675	Cable chinch	only for N4
4822 320 50294	Cable DC1 - F6	not for N4
4822 320 50299	Cable L4 - F2	only for N4
4822 320 50319	Cable L6 - 1911	not for N4
4822 320 50293	Cable SM1 - F1	only for N4
4822 320 50321	Cable L1 - 1915	not for N4
4822 320 50297	Cable L2 - F3	
4822 320 50298	Cable L3 - F8	
4822 320 50299	Cable L4 - F2	not for N4
4822 320 50318	Cable B6 - L8	not for N4
4822 320 50342	Cable 1932 - 1912	only for N4
4822 320 50344	Cable L1 - 1915	only for N4
4822 320 50345	Cable L6 - 1911	only for N4
4822 320 50346	Cable 1103 - 1925	only for N4
4822 320 50343	Cable 1105 - 1922	only for N4

⚠.....Safety component, use only this type